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THE
INSTITUTES AND PRACTICE
OF
SURGERY:
BEING THE
OUTLINES
OF
A COURSE OF LECTURES,

BY
WILLIAM GIBSON, M. D.

PROFESSOR OF SURGERY IN THE UNIVERSITY OF PENNSYLVANIA, SURGEON
AND CLINICAL LECTURER TO THE ALMS-HOUSE INFIRMARY, &c.

Segnius irritant animos demissa per aurem,
Quam quæ sunt oculis subjecta fidelibus.—*Hor.*

SECOND EDITION, WITH ADDITIONS.

—♦—
VOL. I.
—♦—

PHILADELPHIA:

CAREY, LEA & CAREY—CHESNUT STREET.

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Eastern District of Pennsylvania, to wit:

BE IT REMEMBERED, That on the twentieth day of January, in the forty-eighth year of the independence of the United States of America, A. D. 1824, William Gibson, M. D. of the said district, hath deposited in this office the title of a book, the right whereof he claims as author, in the words following, to wit:

"The Institutes and Practice of Surgery: being the Outlines of a course of Lectures, by William Gibson, M. D. Professor of Surgery in the University of Pennsylvania, Surgeon and Clinical Lecturer to the Alms-House Infirmary, &c.

Segnius irritant animos demissa per aures,
Quam quæ sunt oculis subjecta fidelibus.—*Hor.*"

In conformity to the act of the Congress of the United States, intituled, "An Act for the Encouragement of Learning, by securing the copies of Maps, Charts, and Books, to the authors and proprietors of such copies, during the times therein mentioned"—And also to the act, entitled, "An Act supplementary to an Act, entitled, 'An Act for the Encouragement of Learning, by securing the copies of Maps, Charts, and Books, to the authors and proprietors of such copies during the times therein mentioned,' and extending the benefits thereof to the arts of designing, engraving, and etching historical and other prints."

D. CALDWELL,
Clerk of the Eastern District of Pennsylvania.

SKERRETT—NINTH STREET,
PHILADELPHIA.

TO

CHARLES BELL, Esq.

FELLOW OF THE ROYAL SOCIETY OF EDINBURGH,

PROFESSOR OF ANATOMY IN THE ROYAL COLLEGE OF
SURGEONS, LONDON,

TEACHER OF ANATOMY IN THE HUNTERIAN SCHOOL,
GREAT WINDMILL STREET,

Surgeon to the Middlesex Hospital, &c. &c.

MY DEAR SIR,

NEARLY twenty years have elapsed since I had the honour and advantage of residing under your roof, as a private pupil. The sentiments awakened at that period, by your public lectures and demonstrations, by your friendly admonitions, exemplary conduct and persevering industry, have ever since been deeply cherished. For these benefits and many individual acts of kindness, permit me to inscribe to you the following work—as a small but grateful tribute to your splendid abilities and private worth, and believe me to be, with great regard and truth,

Unalterably your friend,

WILLIAM GIBSON.

PREFACE

TO THE FIRST EDITION.

UNACCUSTOMED, in my Lectures, to follow the exact arrangement of any systematic writer, my pupils have felt the want of a *text* book, and at different times have expressed a wish that I should compose one for their use. Long ago I ventured to give them a pledge so to do: a variety of engagements, however, prevented me from commencing the task until a few months past; since then severe and protracted indisposition has rendered the undertaking very oppressive, and so far prevented the execution of my design as to oblige me to offer, at present, a part only of the work. But this I hope, as far as it goes, will answer the purpose for which it is expressly intended, and serve as a guide to those who now and may hereafter honour our school with their presence, whilst it will tend to revive the recollections of former pupils.

As expressed in the title, the work must be considered a mere *outline* of the Lectures, which will

be filled up by numerous illustrations, derived chiefly from an extensive collection of models, morbid preparations, *magnified* drawings, and *imitations* of disease on the dead subject. The two last modes of instruction I consider, in a great measure, peculiarly my own. Be this as it may, I have long been convinced of the importance, in addition to description, of exhibiting as much as possible to the *eye*—being well aware that what is merely told is soon effaced from the memory, whilst an impression received through the sight is comparatively indelible. Upon this principle, my system of teaching is chiefly founded, and to a proper comprehension of it the present work will, I believe, greatly contribute.

Having enjoyed, whilst abroad, ample opportunities of collecting the best ancient and modern surgical writings, and possessing free access to the extensive and valuable library of the Alms-House Infirmary, I have seldom ventured to cite an authority or recommend a publication without having minutely examined its contents. The reference, therefore, given at the end of almost every section, may be relied on as containing the most precise and accurate information on the various topics embraced within the work. This to the student, I hope will prove valuable, especially as great care has been

taken to exclude from the reference every publication of equivocal merit. As an exception to these remarks, it gives me pleasure to acknowledge the assistance I have derived in many instances, from the "*Surgical Dictionary*" of Mr. Samuel Cooper, a book replete, particularly the fourth or last edition, with every variety of surgical information. This I have seldom referred to, intending to commend it in general terms in this place. For the same reason, I have not invited particular attention to the "*Elements of Surgery*" by the late lamented and distinguished Professor Dorsey; a work which cannot be too highly appreciated, and which should be possessed by every American practitioner.

Through the politeness of his excellency P. Pedersen, the Danish minister, I have just received, though not in time to avail myself of some of its valuable contents, the last edition of the "*Systema Chirurgiæ Hodiernæ*" of the celebrated Callisen of Copenhagen, long known as one of the ablest and most learned surgeons of the European continent. A translation of this work by some of our surgeons would confer a benefit on the Profession.

For the fidelity of the sketches accompanying the present volume I can with confidence vouch, some of them having been executed by myself, and others

by the masterly pencil of Mr. Sully. I should prove ungrateful did I not acknowledge the solicitude displayed by the engravers—Messrs. Tiebout, Kneass, Yeager and Childs—that their work should equal the spirit and accuracy of the original drawings.

I do not presume to offer these “Outlines” to experienced members of the profession. They are designed exclusively for those young friends in whose interest I take a lively concern, and from whom I have received so many tokens of kindness and respect.

Philadelphia, 100 S. Third Street.

February 1, 1824.

PREFACE

TO THE SECOND EDITION.

A second edition of the Institutes and Practice of Surgery being called for, and in a much shorter time than, under particular circumstances, could have been expected, is a convincing proof of the importance which my pupils have attached to the work. In every point of view, indeed, I have reason to congratulate myself for having engaged in the undertaking, especially as I have found from experience that during the short and limited term of a four month's course of lectures, it was impossible in noticing every surgical disease to give a *full* account of each. This difficulty has been obviated in a measure, inasmuch as I have been enabled to do ample justice to the most *important* diseases, by referring the class, in some instances, for an account of the comparatively unimportant ones, to the *text* book. By this it is not intended to imply that any department of the course is neglected, but merely to give assurance of particular attention being paid to the pathology and treatment of such diseases as

are of frequent occurrence, and intricate in their nature.

The praises which have been bestowed on the work by European and American critics, though far beyond, in many instances, any merit I should be entitled to claim, have so far proved grateful to my feelings as to encourage me to add such matter to the present edition as I have thought would be most likely to meet approbation and increase the utility of the work—which is still devoted to the particular service of the numerous and respectable pupils who attend our ancient and flourishing school.

Washington Square,

Nov. 1st, 1827.

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THE
INSTITUTES AND PRACTICE
OF
SURGERY.

CHAPTER I.

INFLAMMATION.

THE words inflammatio, phlegmon, and phlogosis, have been indiscriminately employed to denote that disease, in which there is unusual redness, heat, swelling, and pain.

By most writers inflammation has been divided into acute, chronic, healthy, and unhealthy; though not perhaps with much propriety. Two distinct stages of the disease have also been pointed out. In the first stage there is coldness, languor, nausea, pain in the head, a small quick pulse, and a parched tongue. In the second stage the skin is hot, the pulse full and hard, the thirst considerable, and the part affected becomes swelled and painful. Every inflammation, however, is not accompanied by constitutional symptoms.

There are eight *terminations* of inflammation—resolution, adhesion, effusion, suppuration, ulceration, granulation.

cicatrizization, and mortification. These terminations constitute a series of stages, extremely interesting to the surgeon.

The *heat* of inflamed parts is *apparently* very considerable; but it was satisfactorily ascertained by Mr. Hunter, that it never rises above the natural heat of the animal, or that at the source of circulation. An increase of heat, both in healthy and in inflamed parts, probably depends chiefly upon an increased velocity in the circulation of the blood. The heat generally continues so long as the part remains dry, and is speedily diminished upon the appearance of perspiration.

In most inflammations the *redness* is diffused among the surrounding parts, but in inflammation of a *specific* kind, it often stops with an abrupt edge. The redness, in some instances, has a dark hue, in others a bright scarlet. An increase of redness must always depend upon an inordinate determination of blood to the vessels of the part. The red capillaries are first enlarged, and the blood is thence oftentimes transmitted to the serous vessels. These changes have been happily illustrated by some very interesting experiments of Mr. Hunter.

The *swelling* is for the most part confined to the cellular texture, and is commonly greatest where the inflammation commences. At first it is owing to an inordinate quantity of blood determined to the part; its continuance, however, must depend either upon an effusion of serum, or upon an exudation of coagulable lymph into the cellular texture.

The *pain* is acute or otherwise, according to the texture of the part affected. Some organs in their natural state are comparatively insensible, but when inflamed exquisitely painful. In some inflammations, instead of pain, there is a pruritus or itching. In others, the pain is pulsatile. Again, in particular species of inflammation, a burning sensation is produced. The pain, in every instance, perhaps, depends upon the nerves of the part being compressed by the surrounding swelling.

The *causes* of inflammation may act either chemically or mechanically. Among the former, *cold* is supposed to exert a greater power than any other agent. Its first effect is to debilitate the extreme vessels, and to diminish the sensibility of the part to which it is applied. Cold may operate directly or indirectly. In the former case, the part may be irrecoverably destroyed, provided the temperature be sufficiently reduced; in the latter, various degrees of inflammation may arise. How the *indirect* application of cold is productive of inflammation is a question which has never been satisfactorily solved. Cold, when combined with *moisture*, more readily excites inflammation than when deprived of it.

Heat may also be said to produce inflammation by its chemical power, and is a frequent cause of the disease. Like cold, it may act directly or indirectly. In the one case, topical inflammation is generally the consequence; in the other, various disorders of the constitution. Atmospheric air, noxious gases, acids, alkalies, blisters, rubefacients, animal poisons, contagious and specific diseases, may

likewise be enumerated among the chemical causes of inflammation.

The *mechanical* causes of inflammation are contusions, lacerations, punctures, fractures, luxations, long-continued pressure, and innumerable other agents.*

Every part of the body, with few exceptions, is liable to inflammation; but some parts are more prone to it than others. In general it may be stated, that the greater the natural sensibility of a part, the more susceptible it is of the inflammatory process.

The *Serous* membranes are particularly subject to inflammation. The danger, in such cases, is often great, and the pain severe. In many instances, adhesions form from the effusion of coagulable lymph, and the functions of particular organs are disturbed or destroyed;—at other times, a salutary purpose is answered, as, without such agglutination, certain diseases could never be cured.

The *Mucous* membranes, also, take on inflammation very readily; but the effects are very different from those of the adhesive inflammation. In general, the fluids secreted by mucous membranes, are changed in colour and consistence, according to the degree of inflammation existing in the part.

* Those who are anxious to investigate the *proximate* cause of inflammation, as it has been improperly denominated, may consult *Wilson on Febrile Diseases*, *Hunter on Inflammation*, and *Thomson on Inflammation*.

The *Cellular* membrane, especially the skin, is very susceptible of inflammation, which may be either of the adhesive or suppurative kind.

Inflammation is not easily induced in the *Synovial* and *Fibrous* membranes; when once established, however, the pain is often excessively severe, and the consequences very serious.

The *Bones* are subject to inflammation, and very tedious diseases frequently result; but *Cartilage* owing to its supposed want of vascularity, can hardly be said to suffer from inflammatory action.

The *Arteries*, *Veins* and *Absorbents*, are all, more or less, exposed to inflammation. The former are capable of resisting the process to a great degree, while the latter readily yield, and may give rise to various diseases of an alarming nature.

Treatment of Inflammation.

In every inflammation, the first object of the surgeon should be to procure resolution; and this may often be accomplished by removing the exciting causes of the disease. Two classes of remedies may be resorted to—*constitutional* and *local*. Among the former, are *blood-letting*, *purgatives*, *diaphoretics*, and *low diet*. Among the latter, *topical* blood-letting, blisters, and various external applications.

General blood-letting need only be employed where the inflammation is high and attended with disturbance of the system. The quantity to be drawn will depend upon the violence of the disease and the constitution of the patient. Much will depend, also, upon the part in which the disease is seated. *Vital* parts suffer more readily than others, from *depression* being induced; but *all* vital parts are not equally liable to suffer. A good general rule to observe in all inflammations of the vital organs, is to repeat blood-letting *frequently*, and to draw only a small portion at a time. In this way *depression* will be obviated. With respect to the continuance or omission of blood-letting, the *pulse* will, generally, be found a good guide. If it be full and hard and frequent, and rise after the operation, a repetition may, perhaps, be necessary. There are particular states of the pulse which may lead into error—especially the *oppressed* pulse.* The existence or absence of the *buffy coat* will, in many instances, direct us to continue or lay aside blood-letting. Its presence, however, is not always a sure indication of inflammatory action; and, on the other hand, very severe inflammations, occasionally, occur, without any appearance of the buffy coat. Perhaps the most certain indication of the presence of inflammation is the continuance of *pain*; and so long as this remains severe, we can scarcely go wrong in the detraction of blood.

Purgatives and *diaphoretics* are very useful auxiliaries to the lancet. The best remedies of the kind are such as produce nausea. The warm bath will, in particular cases,

* See Rush's Works.

be found extremely serviceable. But, in using it, strict attention should be paid to the degree of temperature.

In certain cases *opium* may be advantageously employed, especially after the full effect of evacuations has been obtained. It should be given, however, with caution.

As a general remedy, *low diet*, or strict attention to regimen, is unquestionably of great importance, in the treatment of all inflammatory diseases; and we have every reason to believe, that by attention to this remedy alone, many formidable diseases have been cured, after resisting all other modes of treatment. For the introduction of this practice into the United States, and for a just estimate of its value, the profession is much indebted to the late Dr. Kuhn and to Dr. Physick.

Among the *local* remedies for inflammation, *topical* blood-letting holds the first rank. It may be performed by *Scarification*, *Cupping*, or *Leeches*. The first is employed only in certain cases; the second is, generally, applied to parts loose and yielding, and not very sensitive; while the third is adapted to almost every external inflammation, and often proves of immense value. The number of leeches must be proportioned to the size of the animals, to the quantity of blood necessary to be drawn, and to the part affected. Unpleasant effects, sometimes, arise from the bite of a leech.

Blisters are very efficacious in most inflammatory diseases. They should sometimes be applied directly over the part, and sometimes in its vicinity. When small. and

frequently renewed, they generally produce better effects, than when large, and applied at long intervals. *Sinapisms* and *Issues* are both, occasionally, used in the reduction of inflammation, and will frequently be found useful.

Cold applications, such as the acetate of lead dissolved in water, cold water itself, ice water, a solution of muriate of ammonia in spirit and vinegar, the water of acetated litharge, and other similar medicines, kept to the inflamed part by linen rags, and changed as often as they become warm, will prove eminently beneficial. Cold may often be employed, also, as a constitutional remedy, in inflammatory diseases; but great caution should be observed that it be not too suddenly applied, or to an immoderate degree.* Strange as it may appear, in certain constitutions and in inflammation of particular parts, cold applications do mischief, and the disease is only benefited by fomentations and *warm* poultices. Whenever such effects are found to follow, the cold should be discontinued instantly, and warmth substituted in its place.

Rest and *Position* are of immense consequence in the treatment of inflammation. How often do we see a very trivial accident, for want of attention to these important points, converted into a troublesome and dangerous disease. Whilst an inflamed or injured part is kept still, the restorative process goes on without interruption; when the part is in motion, reproduction takes place very slowly, owing to irritation, and in many instances is never accomplished. *Position*, by diverting the blood, and keeping

* See Currie's Medical Reports.

the vessels of the inflamed part comparatively empty, may be employed, in almost every situation, and in the extremities especially, which should, always, under these circumstances, be *elevated*, will prove of inestimable value.

Consult *Hunter on Inflammation*, 4to edit. 1794—*Burns' Dissertations on Inflammation*—*Thomson's Lectures on Inflammation*—*Wilson on Febrile Diseases*—*Philips' Experimental Inquiry into the Laws of the Vital Functions*—*James' Observations on some of the General Principles and on the particular Nature and Treatment of the different Species of Inflammation*—*Parry's Experimental Inquiry into the Nature of the Arterial Pulse*—*Broussais' Hist. des Phlegmasies ou Inflammations Chroniques*

SECTION I.

Suppurative Inflammation.

WHEN inflammation does not subside spontaneously, or by the use of the remedies pointed out, other symptoms in a greater or less time, take place. The redness assumes a brighter hue, the swelling increases, becomes more pointed and softer, the pain is materially augmented, and the patient distressed by the pulsation or throbbing.

Besides these local symptoms, constitutional ones soon make their appearance. Rigor or shivering, is a very common occurrence, even when the inflammation is slight. It seldom occurs at regular periods, and is sometimes, in severe inflammations too, hardly to be observed for many hours or days. Rigors often exist for a considerable time previous to the establishment of suppuration. Their presence is almost a sure indication that pus is about to be formed. When once it is formed, other changes take place; the pain and redness diminish, the swelling fluctuates, especially at its apex, and a cavity or abscess is created, which encloses the matter. Purulent matter, however, is frequently formed on surfaces and in situations, where it is not confined by an abscess. It was formerly supposed that pus could not be created except through the medium of the *ulcerative* process. But this opinion was proved to be erroneous by Dr. Hunter. Many believe that pus may be formed, in certain cases, without preceding inflammation.

For various reasons such an opinion should be discounted.

Pus, when healthy, is of a light yellow or cream colour. It is made up of small globules, which float in a watery fluid, and has a strong tendency to putrefaction, especially when mixed with extraneous matter. Pus possesses neither alkaline nor acid properties. *Unhealthy* pus has received different appellations, expressive of the particular changes it has undergone. *Ichor* is a thin and exceedingly acrid discharge. *Sanies* is a very fetid ichor mixed with the red globules of blood. *Sordes* is of a leaden colour, very offensive, thick and apparently coagulated. *Malignant* matter is generated in pestilential diseases, has a peculiar smell, but does not communicate specific disease. *Contagious* matter has the power of contaminating parts to which it is applied, and of always producing a disease of the same character.

Many attempts have been made to distinguish *Pus* from *Mucus*, and from other animal matter, without a satisfactory result,—owing to the vague and uncertain operation of chemical agents, when applied to the investigation of disease and of the products of the living body. Disputes have also arisen respecting the *formation* of pus; some supposing it to be the result of a *putrefactive* process; others that it proceeds from the *dissolution* of the inflamed part; and others, again, that it is produced by a *secretory* action. The last opinion, which there is reason to believe was originally suggested by Dr. Simpson of Scotland, seems the most probable. The first detailed account of the doctrine was given by the late Dr. Morgan of this city, in his

inaugural thesis, published at Edinburgh, in 1763. Mr. Hunter, also, contends that pus is a secretion, and has furnished many strong arguments in support of his opinion.

Hectic fever may accompany any inflammation, but is commonly met with during the suppurative stage. It commences with nausea and a slight chill, which are succeeded by flushes of heat and an increase of pulse. A sweat then breaks out, continues several hours, and is particularly troublesome during the night. After hectic has lasted some time, other symptoms make their appearance, such as a circumscribed red spot on each cheek, and a burning, tingling sensation in the palms of the hands and soles of the feet. The pulse becomes very weak and quick, and the urine high-coloured and full of sediment. To these symptoms succeed flatulence, indigestion and diarrhœa. An opinion formerly prevailed, that hectic always arose from the absorption of purulent matter. Mr. Hunter has put this question to rest, and proved, by a number of well attested facts, that the fever often exists independently of the suppurative process, and accompanies many diseases very opposite in their nature.

Treatment of Suppurative Inflammation.

As soon as it is ascertained that inflammation *must* terminate in suppuration, the remedies employed for its reduction should be abandoned at once, and those substituted which promote the purulent secretion. For this purpose, general means as well as local may be employed. The former are seldom necessary, unless the patient has been much enfeebled by evacuations. In that case, we substi-

tute a better regimen, and employ tonic medicines, mineral acids, and opium.

As *local* applications, fomentations and warm poultices are indispensable. Poultices are more useful than fomentations, as they retain their heat longer, and are more easily applied and renewed. The heat of a poultice should somewhat exceed that of the inflamed part. After the discharge of the matter, the poultice should still be continued for some time. Frequently an unnecessary and profuse discharge is kept up, and in that case mild dressings must supersede the use of the poultice.

Hectic cannot, always, be removed radically. When it proceeds from some local disease, curable by an operation or by other means, the fever will speedily terminate after the disease has ceased. When the hectic cause is such as not to admit of removal, the surgeon can do no more than alleviate the urgent symptoms. The proper medicines are bark, wine, opium, digitalis, and the acids. Animal food is injurious; but vegetables, if not highly seasoned, prove very useful. Dr. Brocklesby* has commended the free use of Seltzer water, to relieve the symptoms of hectic.

See *Home on the Properties of Pus*, in *Observations on Ulcers*, p. 13, edit. 2d. 1801—*Hunter on Inflammation*, p. 371—415, 496—*G. Pearson's Observations and Experiments on Pus*, in the *Philosophical Transactions*, 1811—*Darwin's Experiments, establishing a Criterion between Mucilaginous and Purulent Matter*, 1780—*Thomson on Inflammation*, p. 308—312—323.

* *Medical Observations and Inquiries*, vol. 4. p. 7.

SECTION II.

Ulcerative Inflammation.

IT has been well remarked by Mr. Hunter, "that whenever any solid part of our bodies undergoes a diminution, or is broken in upon in consequence of any disease, it is the absorbing system which does it."* The term *ulcerative absorption* was, therefore, invented by that great pathologist to express that morbid process by which the continuity of the different textures of the body is destroyed. By the ancients it was denominated *erosion*.

Every texture of the body is, perhaps, liable to ulceration, but the *skin* and *mucous* membranes suffer more readily than other parts. This may be exemplified by the extensive eruptions and blotches, which not unfrequently cover the greater part of the body, and by the sores which follow inflammation of the stomach, intestines, œsophagus, schneiderian membrane, urethra and vagina. The *synovial* membranes often suffer from ulceration, but it is seldom that the disease originates in muscles, fasciæ, blood vessels, or nerves. The *bones* very readily take on the ulcerative absorption, and sometimes are rendered by it extensively carious, or else are entirely destroyed. More or less pain is always a concomitant of the ulcerative process. It is, generally, lancinating; though this will depend much

* Page 442.

upon the texture in which the disease is seated. The worst species of ulcerations result from *specific* inflammation. Previous inflammation is essential to the existence of the ulcerative process, and this inflammation is generally of the simple kind, or that which Mr. Hunter has called the *adhesive*. In many instances, however, it follows suppuration and gangrene.

The *treatment* necessary in the ulcerative inflammation, must depend upon a variety of circumstances—such as the constitutional or local origin of the disease, its specific nature, its duration, &c.; all of which will be considered under the head of *Ulcers*.

See *Hunter on Inflammation*, p. 439—*Thomson on Inflammation*, p. 349.

SECTION III.

Mortification.

GANGRENE and sphacelus have been employed by some writers to express the same disease—by others, to comprehend different stages of it. Gangrene, as the term is now generally used, is intended to denote that condition of a part which immediately precedes its destruction. By the word sphacelus, the complete death of a part is understood. The general term *mortification* I shall retain, to designate both stages of the complaint.

When an inflamed part, instead of terminating by adhesion, suppuration, or by some of the other modes formerly pointed out, loses its sensibility, heat and colour, its vitality is extinguished, and mortification ensues. These changes seldom take place suddenly; but are generally preceded by an increase of pain, of a pungent burning kind. The swelling also is increased, the blood still circulates in the larger vessels, the skin becomes soft and of a dark red or purple colour, and vesicles containing a thin serum, are formed beneath the cuticle.

Along with these local symptoms, there is constitutional disturbance. The pulse is quick and tremulous, and of the typhoid character. The tongue is dry and of a brownish tinge, the skin very hot, and the patient restless and uneasy. Delirium, subsultus tendinum, nausea and hiccup fre-

quently supervene. The part soon becomes cold and insensible, and sphacelus is completely established. If a vital part has suffered, the patient often dies; but sometimes it happens, that the constitutional symptoms slowly or suddenly yield; a red line is formed at the junction of the living and dead parts, the latter are separated by *ulcerative absorption*, granulations sprout up, and the patient may recover,—provided the constitution has not been too much weakened by the violence of the disease.

Mortification is said to occur sometimes without previous inflammation—from suspension of the circulation by ligatures, and from ossification of the arterial trunks. There is some reason to believe, however, that, even in these cases, more or less inflammation really takes place, and that in many other instances, although the common symptoms—pain, redness and swelling—be not strongly marked, yet the inflammatory process is present to a certain extent, and contributes to the mischief which ensues.

Almost every texture of the body is liable to mortification; but *mucous* membrane, the *skin*, and *absorbent* vessels are particularly apt to suffer—while the arteries, tendons, ligaments, and fibrous membranes, generally escape.

The *causes* of mortification are innumerable; in general the disease results from inflammation. Gun-shot wounds, fractures, dislocations, simple punctures, concentrated acids, poisons, stimulating applications, infiltration of acrid fluids into the cellular membrane, lightning, burns, long-continued pressure, intense cold, must all operate, more or

less, through the medium of inflammation in producing their several effects. There are some *specific* causes of mortification, which will afterwards be noticed.

Treatment of Mortification.

The remedies for mortification are either *constitutional* or *local*; and those of a very opposite character must be employed under particular circumstances. If, for instance, there be high inflammation which is likely to terminate in gangrene, the antiphlogistic system should be enforced: on the contrary, if gangrene has actually taken place, then a different practice will become necessary. We give bark and wine and other tonics, soups and nutritious food of every description. *Opium* will also be found advantageous, if administered in small doses, and frequently repeated.

Formerly, greater reliance was placed upon *bark* than any other medicine; but of late years, its reputation, in this particular disease, has greatly declined—so much so, that many modern practitioners look upon it as altogether inert. In particular cases I have found it useful, and in others useless if not injurious. *Musk* and *volatile alkali* were recommended, many years ago, by Mr. White of Manchester, as extremely useful in cases of mortification attended with spasmodic twitchings. The latter medicine I have frequently employed with advantage. I have, also, prescribed *camphor*, either alone or combined with opium, and have generally found that the patients were relieved by it. The *mineral acids* are occasionally administered.

They act, however, only as common tonics, and as such may be beneficial. In some cases great benefit will be derived from small doses of the submuriate of mercury. The same may be said of the internal use of the liquor ammoniæ acetatis combined with laudanum.

As *local* remedies, numerous applications were formerly made to mortified parts, under an impression that the progress of the disease might be checked, or the vitality of the texture restored. It is now, however, well understood, that no such influence can be exerted, and that local remedies are chiefly useful in assuaging pain and in keeping the diseased part clean, moist, and free from fœtor. Such applications, indeed, may be useful during the height of the inflammatory stage, and before gangrene has taken place. The best, under these circumstances, are common poultices of bread and milk, moderately warm, and kept constantly applied. Fomentations are sometimes employed with the same view; but they are not so useful as poultices. In the early stages of gangrene, leeches applied directly to the part or its neighbourhood often prove highly beneficial.

When mortification has commenced, and particularly when the cuticle is elevated in spots by a serous fluid, solutions of *sugar of lead*, or mild *ointments*, or a mixture of *lime water* and oil, will be found very soothing. They should be applied by a camel's hair pencil, or by a feather, and care taken to preserve the cuticle entire. When the skin separates, and the surface discharges an offensive matter, then *carrot poultices* mixed with *yeast*, or the *fermenting cataplasm*, will prove extremely useful. In a few cases I have known the patients complain very much after

the carrot poultice has been applied, and relief to follow its removal. Most writers recommend powdered *carbon*, either alone or mixed with a poultice. I have seldom derived much advantage from it; and as it keeps the part to which it is applied black and dirty, so that its real condition cannot always be ascertained, it should, if possible, be dispensed with. A better application, to correct fœtor and to keep the part clean, is the *pyroligneous acid*. I have several times employed this medicine, and particularly in sloughing ulcers and tumours, just before an operation, and have been able, almost instantly, to remove any offensive odour.

The older surgeons were in the habit of *scarifying* all mortified parts, under the idea, that such process would speedily promote their separation. Except in cases of extravasation of urine into the cellular texture of the scrotum, and some other analogous diseases, such an operation is never at the present day performed. Neither will any benefit result from the practice, so common in former times, of applying highly stimulating medicines, such as turpentine, spirits, &c. Indeed, in many instances, manifest injury must be the consequence, especially when the progress of the disease has been stopped, and the sound parts are making efforts to cast off the dead. In such cases, very severe pain follows every dressing, and there is reason to believe that the disease has sometimes been re-established by the continuance of so absurd a practice. *Emollient poultices* will prove more useful in this stage of the disease, than any other applications. To stop the progress of mortification, Dr. Physick has employed, ever since the year 1803, *blisters*, large enough to cover the af-

fect part and a considerable portion of the adjoining sound parts, and has, in many instances, found the practice extremely beneficial.

When patients are confined for a long time in one posture, from fractures, paralysis, typhus fever and other diseases, mortification is very apt to take place in patches on the back and hips. All that can be done, in such cases, is to cover the sores by *adhesive plaster*, and to place bolsters or cushions under the body, so as to change the position of the patient and restore circulation to the injured part.

Amputation is now seldom employed to stop the progress of mortification; for experience sufficiently proves that the disease is afterwards liable to fall on the stump. When a red line has formed, at which the dead separate from the living parts, an operation will become necessary, in order to remove the bone and form a proper stump. But this should seldom be done, until the system has, in some degree, recovered its tone. These points, however, will be discussed under the head of *Amputation*.

See *Kirkland's Inquiry into the present State of Medical Surgery*, vol. 2d. p. 291—*Larrey's Memoirs*, translated by Hall, vol. 2d. p. 205—*Thomson on Inflammation*, p. 501.

SECTION IV.

Chronic Mortification.

By this term I shall designate that particular disease described by Pott, as attacking "*the toes and feet.*" It differs, in some respects, from common mortification, and is chiefly met with amongst aged persons, although young ones are by no means exempt from it. Males, also, are more subject to the disease than females. A small bluish spot is first observed on the inside of one of the toes, from which the cuticle soon separates. This spot spreads in every direction with greater or less rapidity. Sometimes all the toes are attacked simultaneously; in other cases the disease extends gradually from one toe to the other, and thence to the foot and leg. Its progress, in some subjects, is very rapid, in others protracted. Some patients experience excruciating pain,—others suffer very little. I have known three instances in which the patients were not aware of the existence of the disease, until one or more of the toes were extensively affected. In one of the cases the disease seemed to have been brought about by the lodgment of a needle beneath the nail of the great toe. The needle had been carelessly left in a darned stocking, and had penetrated the toe without the patient being sensible of it,—so that its discovery was purely accidental. His constitution had been previously much impaired by intemperance and free living.

According to Pott, the majority of patients labouring under this complaint, feel great uneasiness, especially at night, throughout the ancle and foot, before any discolouration takes place. When once the mortification is fairly established, the patient's constitution sinks rapidly. He is very restless, cannot sleep, is often delirious, and complains of spasmodic twitches. The soft parts gradually separate, or are easily detached, and the bones drop from each other at the joints. The smell of the dead mass is often very offensive, and is sometimes complained of by the patient himself. In almost all the cases I have seen, death has taken place soon after the mortification reached the ancle.

The *causes* of this disease are quite obscure. Cowper first suggested the idea of its being dependant on ossification of the arteries. Dr. Thomson and others have confirmed the fact—that such condition of the vessels is occasionally met with in chronic mortification; but Mr. Hodgson's* assertion, “that it is a constant attendant,” remains yet to be proved. Mr. Pott met with the disease chiefly in gouty subjects.

Treatment of Chronic Mortification.

Formerly, bark was as much employed in this variety of mortification, as in any other form of the disease. It was condemned, however, by Mr. Pott, as useless, if not hurtful; and on this account is now seldom employed. Instead

* On the Diseases of Arteries and Veins, p. 41.

of bark, Mr. Pott recommended opium, which he has praised in the highest terms. I have tried this medicine, however, repeatedly, both in small and in very large doses, and although I have found the pain and urgent symptoms sometimes relieved by its use, I cannot say that it has equalled the expectations held out by Mr. Pott in a single instance. A female patient, 35 years of age, in the Alms-House, during the summer of 1822, suffered for several weeks under this complaint. I commenced with moderate doses of opium, and gradually increased the quantity until she took five hundred drops of laudanum every twelve hours; yet little relief was experienced, and she died some weeks after in a dreadful condition. Bark also was given, both in substance and in the form of extract, without any advantage. Another woman, in the same Institution, whom I attended for the complaint, at the same time, was cured, (with the exception of the loss of the greater part of the foot,) I have reason to believe, by large doses of volatile alkali and by camphor, after opium had failed. Dr. Kirkland condemns the use of opium in large doses in this disease, and says that he has often known the mortification removed under the use of anodyne topics, when its internal use was discontinued, because it brought on delirium and took away the appetite. The same practitioner seems to depend, rather upon mild nutritious articles of food, than upon medicine, for the cure of this complaint.*

Various local applications may prove serviceable,—not in stopping the disease, but in relieving pain, and in keeping the parts moist and free from fœtor. Milk alone, or

* Kirkland's Medical Surgery, vol. ii. p. 42.

milk and water, moderately warm, and frequently applied, will be found very grateful to the patient's feelings. A bread and milk poultice I have used in several cases with advantage, where the carrot and turnip poultices gave pain. Dr. Dorsey* states, "that in the only case he ever saw, the application of a blister produced an immediate termination of the mortification." In the worst of the Alms-House cases, mortification followed the day after the blister was applied, and in a part apparently sound before its use;—in the other no benefit appeared to result, although the blister was applied repeatedly for several days. Blisters have been known to bring on mortification in other diseases, under particular circumstances, and however useful they may prove in common gangrene, I should not feel inclined, from what I have seen, to recommend them in chronic mortification. When the complaint occurs in people considerably advanced in age, I believe that all our efforts will prove unavailing. Amputation has sometimes been resorted to,—but generally without effect.

Sir Astley Cooper condemns amputation altogether in this disease. "In these cases," says he, "you must not amputate; whether there be healthy granulations or not, do not amputate; for as surely as you do, mortification of the stump will supervene, and death quickly ensue."

See *Pott's Works*, vol. 3. p. 185—*Thomson on Inflammation*, p. 533
—*James on Inflammation*, p. 296—*Kirkland's Medical Surgery*, p. 418
—*Cooper's Lectures by Tyrrel*, vol. i. p. 239.

* *Elements of Surgery*, vol. i. p. 29.

SECTION V.

Dry Mortification.

THE dry mortification is, in every respect, a very singular affection. Without previous swelling, redness or pain, the toes and feet lose their heat, become shrivelled, discoloured, and finally converted into a hard, dry, insensible mass, of a dark blue or very black colour. In general, no sloughing takes place; on the contrary, each part retains its original form, the skin remains entire, and the nails adhere to the toes. To the touch the whole affected part feels cold, as hard as a common smoked tongue, and is perfectly free from fœtor.

In some patients, the disease begins suddenly with a burning sensation, which continues for several days, and then as suddenly ceases. In others, the pain is violent, the fœtor and sloughing considerable, and attended by severe constitutional symptoms. For the most part, however, the general health is little disturbed, and the disease continues its course until a line of separation is formed. It seldom proceeds further than the knee, though in a few instances it has reached the hip, or extended to the body, and proved fatal.

This variety of mortification often arises without any evident cause. It can be traced, however, in numerous instances to vitiated grain, especially rye. During very

moist seasons, a substance called *ergot*, *secale cornutum*, or *cockspur*, is sometimes generated in considerable quantity, forming a disease, in which the grains of rye become of large size, firm consistence and black colour. This being mixed with sound rye, is often eaten by whole families, and for some time without inconvenience. In consequence of large portions being taken, the dry mortification is at length produced in the feet, legs, hands, or other parts of the body; and in some European countries, especially France, has appeared, in certain districts, as an endemial disease.

For a considerable time, doubts were entertained as to the real origin of the disease, and many were disposed to believe that its production was totally independent of the ergot. On this account the Royal Society of Medicine of Paris requested M. Tessier, one of its members, to visit those districts in which the complaint was very prevalent, and endeavour to settle, by experiment, the point in dispute. For these experiments a number of the inferior animals were selected, none of which would voluntarily eat the ergot, however disguised by the admixture of other food. All were, therefore, compelled to take it, and its effects upon each corresponded with the quantity administered—mortification in some being readily induced, in others tardily, and proving fatal to the whole, in the course of a few days or weeks. These experiments of Tessier have since been so frequently repeated by others, as to leave no doubt whatever on the subject, and authorize us to conclude that the dry mortification, in the greater number of instances, proceeds from the above mentioned cause.

Were any further illustration necessary to show the power of ergot in the production of dry gangrene, some very interesting facts might be detailed in relation to the disease, as it appeared among the horned cattle, many years ago in Chester county in this state, and in Orange county, state of New York, in 1819 and 1820. Dr. Mease,* a gentleman well known for his extensive researches, and who has paid particular attention to the diseases of domestic animals, was the first to record the fact—that the dry mortification, affecting the legs of cattle, in the instances referred to, proceeded from the use of the *green grass*, (*poa viridis*,) the ends of the seeds of which, to some extent, were affected with the smut or ergot. Lately, a very interesting account of the same disease, and a confirmation of Dr. Mease's statement, has been given by Dr. Arnell.†

I have met with two or three examples of the genuine dry mortification in this country, neither of which, as far as could be determined arose from the spurred rye. In one instance, the disease appeared to be the consequence of fracture—the patient at least had received a fracture of both thighs, and of the left leg, from which he recovered in four or five months. At the end of that time, a dark spot appeared on one of the toes of the right foot, spread thence to the other toes, and finally involved the greater part of the leg, which became perfectly cold, insensible, dry, hard, withered, and of a deep purple colour. The skin remained entire, except at the upper part of the leg,

* Domestic Encyclopedia, vol. ii. p. 52, and vol. iii. p. 196.

† The Plough Boy and Journal of the Board of Agriculture, by S Southwick, vol. iii. p. 41.

where it sloughed, along with a portion of the muscles. In this condition the patient remained several months longer, without pain or material injury to his general health, when I was requested to visit him at York, Pennsylvania, in consultation with Dr. Spangler of that place. It was decided that amputation alone could afford relief. I accordingly performed the operation, (on the 16th January, 1816,) immediately below the knee, and with complete success. Ever since that period the limb has remained in my surgical cabinet, exposed constantly to the air, is now perfectly free from foetor, as it was indeed at the time of the operation, and has never since undergone the slightest change. There is every reason to believe, in this case, that the mortification was the result of the different fractures, for upon repeated inquiries, no evidence was afforded that the patient had ever lived upon damaged grain of any description: on the contrary, he was a wealthy farmer, and had always used the most wholesome articles of food.

A very beautiful specimen of dry gangrene was presented to me during the winter of 1827, by Dr. E. Swain of Bristol. It occurred in the practice of Dr. Phillips, an eminent physician of that borough. The patient was seventy-two years of age, and had long been subject to extensive ulceration of the ankle. The disease commenced in the toes, and gradually extended over the foot, which finally separated from the leg. She lived five weeks afterwards, and during the whole course of the disease experienced no pain.

The dry is not so fatal a disease as the chronic mortification. Where it has prevailed endemially, however, very

few have recovered. In favourable cases, and in young subjects, amputation has often succeeded, and under any circumstances must be considered the only remedy.

See Thomson on *Inflammation*, p. 538—Boyer's *Treatise on Surgical Diseases*, translated by Stevens, vol. 1. p. 77—Gooch's *Works*, vol. 2. p. 367—Prescott on the *Natural History and Medicinal Effects of the Scæle Cornutum*, &c. 1813.

CHAPTER II.

VARIETIES OF INFLAMMATION.

AFTER the account given of common inflammation and its terminations, it will be proper to notice certain diseases, which differ, in many respects from the original affection and from each other. These affections, there is reason to believe, are very often dependant upon constitutional peculiarities; but in other instances, they result evidently from some particular local irritation. The most common varieties of the disease are erysipelas, boil, carbuncle, chilblain, frost-bite, and burns; each of which it will be proper to treat of in separate sections.

SECTION I.

Erysipelas.

A GREAT diversity of opinion has prevailed among writers respecting the nature and seat of erysipelas. Some indeed contend, that the relation between it and inflammation is very remote.* This statement is probably without foundation, though it must be confessed that our knowledge of the complaint is very imperfect.

Erysipelas commonly attacks some part of the cutaneous texture, and exhibits the following appearances. The surface of the affected part is elevated and of a bright scarlet colour, mixed occasionally with yellow and dusky red, and having an abrupt termination. The redness is accompanied by a burning sensation, or by itching. When pressure is made upon the swelling, the redness disappears, leaving a white spot in its place. The redness, however, is quickly restored upon the pressure being removed. In some cases small vesicles, containing an acrid serum, appear on the diseased surface.

Erysipelas is not always attended by constitutional symptoms; but, generally, more or less rigor, fever, nausea, headach and loss of appetite precede the complaint. These symptoms cease about the third day, and the redness and

* See Pearson's Principles of Surgery, p. 187.

swelling soon after take place. In mild cases the cuticle separates in flakes, and the skin beneath assumes a healthy aspect. When vesicles form, they either dry up and desquamate, or else terminate in ulceration or sphacelus. Erysipelas differs, in many respects, from phlegmon; in certain cases, however, the two affections are combined.

Authors have enumerated various species of erysipelas, and have designated each by particular names. Some of these species, it appears to me, are imaginary, and others to be considered as accidental symptoms only of the complaint. Were I to follow the arrangement of any individual writer, it should be that of Pearson,* by whom the disease has been divided into three species—acute, œdematose, and malignant erysipelas.

Very often erysipelas arises without evident cause, and spreads rapidly from one part of the body to another. In other instances, the disease can be traced to the operation of some specific agent—such as the application of vegetable, animal, or mineral poisons—to wounds, fractures, exposure, intemperance, derangement of the digestive organs, violent passions of the mind, contagious diseases, impure air, &c.

Treatment of Erysipelas.

In the commencement of the attack, blood-letting, purgatives, diaphoretics and low diet will be found the most

* Principles of Surgery, p. 197.

appropriate remedies. Leeches, in most instances, should be preferred to general blood-letting. The French have long employed this remedy with great advantage in erysipelas, and the practice is still recommended by their best authorities, especially by Broussais. Dr. Neill, an eminent practitioner of this city, has detailed several cases in proof of the efficacy of this mode of treatment.* Desault and Boyer extol the use of emetics in that variety of erysipelas denominated *bilious*. After full benefit has been derived from the antiphlogistic plan, opium, bark and camphor may, perhaps, become necessary; at all events care must be taken that the evacuations are not carried too far, otherwise the disease may terminate in mortification. When erysipelas occurs in persons debilitated by the immoderate use of ardent liquors, it will be found expedient in most cases of the kind to continue such articles, otherwise the patients are almost sure to sink.

As local applications, weak solutions of the acetate of lead, cold water, and other similar means, often prove beneficial. Blisters are extremely efficacious, but should not be applied, according to Pearson, upon the diseased surface, on account of the troublesome sores which sometimes follow. Such effects I have never witnessed, although in numerous instances I have covered the inflamed part with a very large blister. Warm solutions of opium, frequently applied, I have found very useful in allaying the peculiar burning pain and itching, which so commonly attends the disease. But of all local applications the *mercurial* ointment is undoubtedly among the best. It was first introduced into practice

* North American Medical and Surgical Journal, Vol. I. p. 295

in this complaint, by Drs. Dean and Little of Chambersburg in this state. A practice very commonly prevails, in the preparation of this medicine, of mixing with it turpentine and other stimulating ingredients. The ointment, thus prepared, if used in erysipelatous inflammation, will increase rather than alleviate the disease; but when divested of such materials, speedily relieves every urgent symptom, especially in that troublesome form of the complaint which so frequently attacks the face.

Within the last two years I have frequently employed in erysipelas, and with most decided benefit, the preparation known under the name of *British oil*. It is singularly useful in removing the itching that usually accompanies the disease. In this respect I know of no local application at all equal to it. Dr. Reynell Coates, informs me that he has often used, with great effect, the tar ointment, in obstinate cases of erysipelas.

Most practitioners recommend, as external applications, various powders, such as starch, flour, chalk, and impure carbonate of zinc. I have seldom found these articles useful; but, on the contrary, often injurious,—by mixing with the fluids discharged from the vesications, and forming crusts or scabs, which irritate the subjacent skin.

For the treatment of erysipelas combined with phlegmon, a practice has lately been introduced by Dr. Hutchison, of making numerous longitudinal incisions an inch long, down to the muscles, in the early stages of the disease, in order to give free vent to the secretions, which are apt to form and collect in sacs. Dr. Hutchison states, that during five

years, in which the practice was employed at the Deal Hospital, not a case was lost.

See *Pearson's Principles of Surgery*, p. 186—*Desault's Works*, translated by *Smith*, vol. 1. p. 502—*Boyer's Treatise on Surgical Diseases*, by *Stevens*, vol. 1. p. 220—*Bateman's Practical Synopsis of Cutaneous Diseases*, p. 125—*Hutchison's Practical Observations in Surgery*—*Hutchison*, in *Medico-Chirurgical Transactions*, vol. 5. p. 278—*James on Inflammation*, p. 234—*Cooper's Lectures*, by *Tyrrel*, vol. 1. p. 244

SECTION II.

Furunculus, or Boil.

THE furuncle is a hard, painful and highly inflamed tumour, of a conical shape, the base of which is below, and the apex slightly elevated above, the level of the skin. The colour of the tumour is of a dusky red, inclining to purple, and its summit is tipped by a whitish pustule or eschar, beneath which is lodged a mass of disorganized cellular membrane, commonly called a *core*. Although this tumour always terminates in suppuration, its progress is slow, and the matter never assumes a healthy aspect, but is thick, sanious and ill-conditioned.

Boils may occupy the cellular tissue of any part of the body. Sometimes they are very numerous, and though seldom attended with danger, may occasion great inconvenience to the patient. They arise without evident cause, and frequently in healthy constitutions. At other times, they follow eruptive diseases and typhus fever.

Treatment of Furunculus.

It is seldom possible, even in the commencement of this disease, to procure resolution; and when accomplished, the tumour is very apt to return repeatedly, and can only be

removed eventually, by the establishment of suppuration. On this account, it is better in every instance to encourage this process at once, by the continued use of warm poultices or fomentations. As soon as the apex of the swelling becomes soft, an opening should be made into it, sufficiently large to enable us to remove the core; after which poultices may be reapplied, or else the cavity filled with lint, spread with stimulating materials—such as red precipitate mixed with basilicon ointment. A solution of lunar caustic, in the form of injection, I have sometimes used, advantageously, for the purpose of stimulating the cavity, and causing it to fill up.

See *Lassus, Pathologie Chirurgicale, tom. 1. p. 15*—*Pearson's Principles of Surgery, p. 70.*

SECTION III.

Anthrax, or Carbuncle.

THE carbuncle, in some respects, resembles the furuncle. It is a deep-seated, circumscribed, hard and very painful swelling, of a livid hue, attended with excessive pruriency and burning heat. From furuncle it differs, in having no central core, and in terminating by slough instead of suppuration. Symptoms of common inflammation sometimes attend the commencement of the complaint; but these are soon superseded by vesications, containing an acrid, sanious fluid, which is discharged from numberless pores, occupying every part of the surface of the tumour, and communicating with cellular cavities in a mortified state.

Constitutional symptoms not unfrequently attend this disease from its commencement to its termination. In particular there is nausea, loss of appetite, fever, great prostration of strength, want of sleep, to such an extent as in some instances to destroy the patient. But most persons recover from the attack, after having suffered immensely. When situated on the head, carbuncles are almost sure to prove fatal, by giving rise to effusion and consequent compression of the brain.

Treatment of Anthrax.

Very opposite modes of treatment must be pursued, in the incipient and advanced stage of carbuncle. In the former, all irritating applications prove highly injurious; while in the latter, certain stimulating remedies can alone be depended on. An emollient poultice in the commencement affords more relief than any other application, and should be continued until vesications appear on the surface. Sometimes it will be found useful to make one or more incisions over the surface of a carbuncle, and afterwards apply an astringent poultice. To assuage pain and procure sleep, opium must be freely employed; and where the patient is much debilitated, bark, elixir of vitriol, ammonia, and an invigorating diet, are the proper remedies. Blisters* have been highly extolled in the treatment of carbuncle; but I have never found them useful, except in abating the pain attendant upon the disease.

When openings form and discharge a bloody serum, the poultice should be laid aside, and the surface of the tumour, as far as the openings extend, covered freely with the caustic vegetable alkali. The caustic gives some pain, but this soon subsides, and the severe burning pain, peculiar to the disease, is from that time entirely removed. Dr. Physick, to whom we are chiefly indebted for our knowledge of the proper application of this remedy, states, that "in all the cases in which he has used the caustic in this manner, the suffering of the patient ceased as soon as

* Dorsey's Elements, vol. i. p. 25

the pain from the caustic subsided.” It should be recollected then, that the caustic will prove hurtful in the commencement of carbuncle, but extremely beneficial in the second stage, or at that period when openings form in the tumour. From inattention to these circumstances, there is reason to believe much mischief has resulted—from deep, ill-timed incisions, from the actual cautery, and from caustics, which have long been employed, at an improper period, especially by the French surgeons.

See *Bromfield's Chirurgical Cases and Observations*, vol. 1. p. 118—*Boyer's Surgery*, vol. 1. p. 241—*Physick's Case of Carbuncle, with Remarks on the Use of Caustic in that Disease, in the Philadelphia Journal of the Medical and Physical Sciences*, vol. 2. p. 172—*Larrey's Memoirs*, by *Hall*, vol. 1. p. 51.

SECTION IV.

Pernio, or Chilblain.

THIS inflammatory affection is the result of cold, or of the sudden transition from cold to heat, and is commonly met with in extreme parts of the body, such as the toes, heels, fingers, ears, nose and lips. At first the skin is pale and shrivelled; this state, however, is quickly succeeded by redness, tumefaction, more or less pain, pruritus and œdema. In bad cases the skin assumes a purple cast, the itching or tingling becomes intolerable, a serous fluid collects beneath the cuticle, and is soon discharged, leaving an ill-conditioned sore, which often penetrates to the bone, and is exceedingly difficult to heal.

The mild form of this complaint, or that unattended by ulceration, is by no means uncommon, especially in moist and temperate climates, where it often disappears spontaneously during summer, and regularly returns in winter, attacking for the most part patients who have previously suffered.

Treatment of Pernio.

Very common applications in the simple or mild form of chilblain, are ice water or snow; and there can be little doubt of their general utility, when used with moderation.

To certain patients they are not adapted,—especially those inclined to phthisis or subject to the gout; nor are they suitable for delicate females. Spirituous embrocations often prove serviceable. Soap liniment, volatile liniment, spirit of turpentine, and tincture of cantharides are the best remedies of this class. I have frequently known the mild chilblain cured in a few days, simply by covering the part with carded cotton. An alum curd is sometimes a very effectual remedy.

For the ulcerated chilblain, some of the stimulating ointments, as the unguentum hydrargyri nitrati, or basilicon mixed with red precipitate, are often advantageously employed. Solutions of lunar caustic, or of the preparations of lead, or lime water mixed with linseed oil, are likewise useful. At first, these remedies are scarcely felt by the patient; but in a little time the sore becomes exquisitely sensible, and should then be covered with poultices and mild dressings until completely healed.

According to *Lisfranc* the chloride of lime is a very useful remedy in the ulcerated chilblain. In one obstinate case of the kind this surgeon covered the affected part with perforated plasters of simple cerate. Pieces of lint dipped in a solution of the chloride of lime, were then applied and renewed every twenty-four hours, and soon effected a perfect cure.

See *Pearson's Principles*, p. 153—*Thomson on Inflammation*, p. 646—*Rees' Cyclopaedia*, vol. 8. part 1—*The Art of preserving the Feet, &c., by an experienced Chiropodist*, p. 149. London, 1818.

SECTION V.

Frost-Bite.

INTENSE cold applied to the body, or to a part, may produce effects very different from those last mentioned. The vital functions may be entirely extinguished, or only suspended, or else some particular texture may be destroyed, through the medium of mortification. Although many instances are on record, of persons having died from exposure to severe cold, and of others recovering after the suspension of animation for a considerable time, yet such consequences are rare, compared with the partial injuries which result from *frost-bite* or mortification. Few cold seasons, indeed, pass away, especially on our sea-coast, without numerous instances of frost-bite taking place. The part to which the cold is applied first becomes benumbed, stiff and insensible. These symptoms are succeeded by heat, swelling, and more or less pain; the skin assumes a livid hue, and suppuration soon takes place between the sound and injured parts. If the surgeon be called in time, which is seldom the case, the warmth of the part, by proper treatment, may perhaps be restored, and mortification prevented. When the cold is long-continued, and so intense as to affect the internal organs, the symptoms are drowsiness, shivering, rigidity of the limbs, diminution of the circulation, and finally profound sleep, which often terminates in death.

Treatment of Frost-Bite.

Premature exposure of frost-bitten parts to heat, has frequently been attended with the worst consequences. Instead, therefore, of laying a patient in a warm room, or before a fire, cold applications, such as snow, or ice water, should first be employed, taking care that very little force be exerted upon the frozen part, lest it be broken or otherwise injured by the friction. After the natural temperature has been restored, moderately stimulating embrocations such as camphorated spirit of wine, will perhaps be found useful. But sometimes the inflammation is so active as to require cold solutions of the acetate of lead, and other similar applications. In most instances, however, there is a strong tendency to gangrene, and the most powerful stimulants will of course be required to arrest its progress. When mortification has once taken place, the remedies adapted to that particular state must instantly be employed. An oat-meal poultice mixed with stale beer, is among the best local applications that can be employed.

When the system is affected by cold to such an extent as to render the patient insensible, various means may be used to produce reaction. The chief indications are to excite the muscles of respiration, and to restore the circulation. The former may often be accomplished by sternutatories and volatiles, and the latter by frictions with flannels, covered with stimulating materials, and applied to the whole surface, particularly to the epigastric region. This treatment should be continued, unremittingly, for a considerable time; for instances have occurred of recoveries, af-

ter the lapse of several days, and under the most unfavourable circumstances. Some writers recommend the immersion of the whole body in ice water; but the practice cannot prove otherwise than injurious, and should never be pursued. After the patient has been somewhat revived, by the means pointed out, it will be proper to administer stimulants internally, such as brandy and water or a little warm wine. Very often it will become necessary to keep up for some time the patient's strength. In such cases the internal use of the sulphate of quinine, or of musk and ammonia combined, will prove exceedingly beneficial.

See *Kellie's Case of Torpor from Cold, in Edinburgh Medical and Surgical Journal*, vol. 1. p. 302—*Thomson on Inflammation*, p. 613—*Larrey's Memoirs, by Hall*, vol. 2. p. 156.

SECTION VI.

Burns.

BURNS are very common accidents, and produce, not unfrequently, immense injury, and even death. From the time of Hildanus to the present day, they have, commonly, been divided into three species. The particular arrangement of Pearson—the *superficial*, *ulcerated*, and *carbunculous* burn—appears to me the most satisfactory. In the *first*, the cuticle is injured, but does not separate from the cutis, until a new one is nearly formed. The pain and swelling are inconsiderable, and there is no vesication. In the *second*, the cutis is extensively injured, a serous effusion takes place, the cuticle separates, and leaves behind a painful and suppurating sore. Constitutional symptoms, such as rigors, a quick small pulse, followed by a hot skin, furred tongue, and difficult respiration, are likewise common attendants. The *third* species, or the carbunculous or sloughing burn, is that in which the cutis and adjoining parts are disorganized, and converted into a hard eschar. The local and constitutional symptoms are extremely severe, and the shiverings, for several hours after the accident, almost incessant. The pulse is very feeble and quick, and the asthmatic symptoms are so urgent that the patient can scarcely breathe. If he recover from the shock communicated to the system, the slough separates in a few days and leaves a very painful ulcer, which is soon covered with fungous granulations, and will always be found very diffi-

cult to heal. The symptoms, however, in all the three species of burns must necessarily vary very much, according to the degree of heat applied, the extent of the surface injured, the peculiar constitution of the patient, and a variety of other circumstances.

Treatment of Burns.

Two very opposite modes of treating burns have been in use from time immemorial—by *refrigerants* and *calefacients*; and it is not easy to determine which are the most beneficial. There can be little doubt, however, of the utility of both, provided they are judiciously employed.

In *superficial* burns, rags dipped in cold water, and constantly applied to the part, afford great relief. Still better effects result from pounded ice, mixed with hog's lard, or inclosed in bladders. Cold scraped potatoes or turnips are very commonly applied to a burnt part, and are found very soothing and agreeable. But the best application I have ever tried is *raw cotton*, thinly spread out or carded, and laid directly over the burn. The value of this remedy was ascertained, accidentally, a few years ago, by a lady living in Harford county, Maryland, whose child was scalded by boiling water, nearly over its whole body. The mother was carding cotton in an adjoining room at the time of the accident, and having no medical assistance within reach, undressed the child as quickly as possible, and covered the whole burnt surface with masses of the cotton. The effect was wonderful; for the child soon became per-

fectly quiet, fell asleep, and upon removing the cotton, a few hours afterwards, no inflammation whatever could be perceived. Dr. Dallam,* to whom we are indebted for an account of this case, has furnished others of a similar character, in which the cotton proved equally efficacious; and my own experience enables me to confirm his statement of its usefulness. It is only, however, in the *superficial* burn that this remedy can be relied on. A mode of treating burns somewhat analogous to that of Dallam, has been commended by Velpeau of France—by compression. A roller is accurately applied to the injured part as soon as possible after the accident. “By the paper of Velpeau it appears that in a burn of the slightest or first degree, a compressing bandage prevents the development of inflammation; in the second degree it hinders the occurrence of blisters, or if not employed sufficiently early to do so, re-attaches the epidermis, and occasions the absorption of the effused serum. In the third degree it cannot prevent an eschar, but renders the accident less painful,” &c. *Vinegar* has been highly extolled, of late years, as an application for burns, by Mr. Cleghorn, a celebrated brewer at Edinburgh, whose workmen often suffered severely from such accidents. I have tried it in many cases of burns, but have never known it of service except in the first species. If used during the vesicated or ulcerated stage, the pain is intolerable.

The *ulcerated* burn requires a treatment very different from that of the superficial burn. Openings should first be

* See Dallam, on the Use of Cotton in Burns, in Potter's Medical Lyceum, p. 22.

made with a needle through the cuticle, to discharge the serum collected beneath; taking care, at the same time, not to tear the cuticle, or expose the raw surface of the cutis to the air, which always has the effect of creating considerable irritation. When ulceration takes place, the patient generally suffers severe pain, and emollient poultices will then be found to afford more relief than any other applications. These should be continued so long as they seem to agree with the sore. Powdered chalk, or lapis calaminaris, sprinkled over the whole surface of the burn, and occasionally renewed, are productive of the best effects. The linamentum ex aqua calcis, spread upon fine old linen, and kept constantly in contact with the ulcerated surface, I have often employed with great advantage.

The *calefacient*, or stimulating plan of treatment, is chiefly adapted to the carbunculous or sloughing species of burn. Remedies of this class are not only applied to the injured surface, but are often administered internally, on account of the shiverings, weak pulse, and other symptoms denoting severe constitutional derangement. Great care should be taken, however, lest such medicines be continued too long, or given in too great quantities; for it often happens, after the first effects of the burn subside, that violent reaction takes place, and can only be subdued by rigid attention to the antiphlogistic system. But in almost every stage of a burn, where the constitutional disturbance and pain are considerable, *opium* may be freely and beneficially resorted to. The stimulating articles, usually employed *externally*, are spirit of wine, or spirit of turpentine, either alone or mixed with oils or ointments, and applied to the injured parts by a feather, brush, or by linen rags.

In some cases they excite violent pain, especially when laid on the sound skin. Baron Larrey has condemned all the common modes of treating burns, and depends, chiefly, upon dressings composed of saffron ointment, spread on old linen, from which he states that he has derived the most salutary effects.

From carelessness on the part of the surgeon, it often happens, that fingers, toes and other parts grow together, and produce unnatural contractions or extensions. Such accidents may always be prevented, by interposing lint, or plasters, between the burnt parts, and by using splints and bandages.

The mode of relieving these deformities is to cut across the adhesions at particular spots, and restore the parts to their former position; taking care to prevent reunion during the progress of the cure. The operation does not always succeed; although it has answered the purpose in all the cases in which I have tried it. On account of its occasional failure, Mr. Henry Earle has proposed to remove the cicatrices altogether, and bring the edges of the sound skin towards each other, in a transverse direction, and there retain them by adhesive strips.

See Thomson on Inflammation, p. 585—Pearson's Principles of Surgery, p. 171—Earle on the Means of lessening the Effects of Fire on the Human Body—Kentish on Burns—Larrey's Memoirs, vol. 1. p. 43—H. Earle, in Medico-Chirurgical Transactions, vol. 5. p. 96—Dickenson on Burns and Scalds.—Cases in which the operation for the removal of cicatrices from the neck consequent on burns, was successfully performed, with remarks. By Dr. H. James, surgeon to the Devon and Exeter Hospital, in Medico-Chirurgical Transactions, vol. 13. Part 1.

CHAPTER III.**WOUNDS.**

WOUNDS may be divided into incised, punctured, penetrating, contused, lacerated, poisoned and gun-shot. These admit of subdivision—as wounds of the head, face, neck, chest, belly and extremities. All such injuries will prove more or less dangerous, according to their extent, the manner in which they are inflicted, the age and constitution of the patient, the situation and texture of the wounded part, the treatment that may be adopted, and a variety of other circumstances to be considered hereafter. In general it may be stated, that wounds involving large blood-vessels, nerves and joints, are more hazardous than others—that a very trivial wound in a bad constitution will sometimes give rise to most violent symptoms, and even death; and that, on the other hand, very extensive wounds often terminate in the most favourable manner.

SECTION I.

Incised Wounds.

INCISED wounds are the most simple, and, independently of hemorrhage, the least dangerous of all. Profuse bleeding, however, is very apt to take place, even from vessels of moderate size,—provided the cutting instrument is exceedingly sharp. A wound produced by a dull instrument, on the contrary, seldom pours out much blood. As soon as any part is divided, there is a recession of its edges,—owing either to the size of the instrument by which it is produced, or to the elasticity and contractility inherently possessed by most living textures.

Treatment of Incised Wounds.

The chief indications, in the treatment of an incised wound, are to suppress the bleeding, and afterwards to retain the edges in contact, by such means as are best calculated to favour their reunion. The removal of foreign bodies is also, in many instances, an object of considerable importance.

Hemorrhage may be stopped either by ligature or by compression. The first is always the most effectual, and should be resorted to whenever the situation of the wound

will admit of it. The *tenaculum*, *needle*, and *forceps*, are the instruments commonly employed for casting a ligature around the divided vessel. When the wound is open, not very deep, and the vessels large, the *tenaculum* will be found the most convenient. The point of the *tenaculum* should be moderately curved, and not very sharp, otherwise the surgeon will find it difficult to catch the mouth of the artery, and when caught the instrument is liable to cut itself out. After the bleeding vessel is drawn out, it may be tied by an assistant, or if no one be at hand, the surgeon will often succeed by holding the handle of the *tenaculum* between his teeth, and using his own hands for drawing the ligature. Upon such occasions, a *tenaculum* with a leaden handle, sufficiently heavy to drag out the vessel when suspended from it, will prove very useful. The *artery forceps*, which should always be serrated at the extremities and have a moveable slide to close the blades, will answer nearly the same purpose as a *tenaculum*. The *needle* is now seldom used for securing bleeding vessels, because it is necessary to include with it more or less of the surrounding soft parts, and in so doing important nerves may be tied, or vessels of considerable size opened, from both of which much mischief will result. For taking up deep-seated arteries, beyond the reach of a *tenaculum* or common needle, Dr. Physick has employed, ever since the year 1800, a *forceps*, so constructed as to hold in its extremities a needle armed with a ligature. The handles of the forceps are fastened together, temporarily, by a string or catch, and when the needle is fairly deposited beneath the vessel, it is disengaged from the forceps and drawn out, leaving the ligature behind, which can be tied without diffi-

culty.*—For a view of these different instruments, see Plate I.

Ligatures are commonly made of thread, silk, or leather. All may occasionally be used with advantage, provided they are of a proper shape and size. Round ligatures are superior to the flat or irregularly twisted, inasmuch as they divide the internal and middle coats of the vessel with uniformity. The use of the leather or *animal* ligature was first suggested by Dr. Physick,† in the year 1806; but no account of it was published until 1816.

The best material for the animal ligature is *French kid leather*, cut into strips from a quarter to half an inch in breadth, (the grain or polished surface being previously peeled off,) well soaked in water and then stretched and rounded. *Buck skin* or parchment, treated in the same manner, make very good ligatures. *Catgut*, although recommended by some surgeons for the same purpose, I have never found suitable. The advantage possessed by the animal, over ordinary ligatures, is its speedy decomposition and separation from the artery, whereby the patient is saved much unnecessary irritation and pain. For several years past I have practised the plan first recommended by Veitch—of cutting off one end of every ligature and leaving the other hanging from the wound, in order to dimi-

* Dr. Physick's forceps is a modification of the *Acutenaculum* or *Port-Aguille*, an instrument used by the older surgeons for *sewing wounds*. Richerand recommends a needle mounted upon a handle for taking up deep-seated arteries. See *Nosographie Chirurgicale*, tom. iv. p. 37. edit. 4th.

† See *Eclectic Repertory*, vol. vi. p. 389.

nish irritation, and have had good reason to be pleased with the result. I have also tried, upon several occasions the method, (mentioned it is said as early as the year 1786 by Mr. Haire* of England,) of cutting off both ends of the ligature close to the knot, and then healing the wound over them—but generally without any manifest advantage. The fact that a ligature divides the internal and middle coats of an artery, leaving the external coat entire, was first pointed out by Desault.

Compression may be accomplished either by the *tourniquet*, or by *rollers* and *pledgets*. The *tourniquet*, (see Plate I.) is chiefly adapted to wounds of the extremities. When the regular instrument is not at hand, a very convenient one may instantly be made, by tying together the ends of a common handkerchief, throwing the circle around the limb, and twisting with a stick until the necessary degree of pressure is effected. The roller and compress may often be used with advantage, when the bleeding vessel is superficial and supported by a bone, as in the wrist and temple. *Agaric* and *sponge*, formerly much used for arresting hemorrhage, are now seldom employed. Under particular circumstances, however, the sponge will prove very serviceable, especially in hemorrhage from deep cavities. *Styptics*, of which the older surgeons were very fond, are scarcely ever thought of, and the *actual cautery* anciently resorted to upon the most trivial occasions, is nearly banished from practice.

Pieces of glass, and other foreign bodies, are occasionally lodged in incised wounds. They should always be care-

* See Hennen's Principles of Military Surgery, p. 181. 2d edition.

fully picked away; for if left behind, great irritation will be excited. Sometimes bits of glass are working out for months or years after the wound has healed, and frequently are never found. The wound should always be kept open, and covered with an emollient poultice, when there is reason to suspect the lodgment of such articles. Blood, interposed between the edges of an incised wound, may act as an extraneous substance, and on this account ought to be removed before they are brought together.

Adhesive plasters are preferable to all other means for retaining in contact the lips of a wound. The parts to which they are applied, should be perfectly free from moisture, and if covered by hair, closely shaved. It is difficult, in many instances, to obtain plaster sufficiently adhesive to prevent the edges of the wound from gaping. The material chiefly resorted to at present, is a mixture of lead plaster and resin, in the proportion of a pound of the former to two ounces of the latter. This composition should be melted and thinly spread on new linen, which must then be cut into strips of a length and breadth adapted to the extent and situation of the wound. Spaces should be left between the different strips, for the escape of matter; otherwise abscesses are liable to form. Adhesive straps may be assisted very much in some cases by bandages, particularly by the *uniting bandage*, which is merely a double-headed roller, with a slit in its centre, sufficiently large to admit one head of the roller to pass through, so as to form a loop well calculated to grasp a limb and afford great support. Previously to the application of plasters and bandages, it is of great consequence to place the wounded part in a *proper position*.

Sutures are, at the present day, only used when the wound is so extensive, or so situated, as not to admit of the application of adhesive straps. There are only two sutures in common use—the *twisted* and *interrupted*. The twisted is made by passing a silver pin about two inches long armed with a moveable steel point, or a common sewing needle fixed in a temporary handle, through both edges of the wound, and then casting a ligature obliquely from one end of the pin or needle to the other in the form of the figure 8. This suture is well adapted to wounds of the face, lips, &c. To make the interrupted suture, two crooked needles, one at each end of a ligature, are necessary. The needles are entered on the inner sides of the wound and brought outwards, carrying with them the ligature, which is tied directly across the wound. In extensive wounds, a number of these stitches will be required, and should be placed at moderate distances from each other. Neither the interrupted nor twisted suture should ever be made in an inflamed part, if possible to avoid it.

The object of adhesive straps, bandages and sutures, is to procure adhesion, or *union by the first intention*, as it has been denominated. This very important process was well understood by some of the older surgeons, particularly by Taliacotius of Bologna, who succeeded, by means of it, in restoring mutilated parts, and to a surprising extent. Mr. Hunter restricted the term union by the first intention, to that state in which the divided parts are held together, temporarily, by the interposition of blood. By most surgeons, no distinction is drawn between it and the adhesive inflammation. The French surgeons are, for the most part, extremely averse to the practice of closing

wounds, after injuries or operations, for the purpose of procuring a speedy adhesion. They believe that secondary hemorrhage and abscesses not unfrequently result, and give rise to very troublesome consequences. Such apprehensions, however, are extremely unfounded in the generality of cases, although it is certain that much mischief has occasionally arisen, especially after amputation, owing to the edges of the wound having completely healed, while the deeper parts suppurated. On this account, Dr. Physick has for many years been in the habit, in all amputations, of placing a bit of lint between the divided skin, to prevent immediate reunion. Besides these instances, cases undoubtedly occur in which it would be improper always to bring about direct adhesion—as in certain morbid or cancerous parts. On the other hand, by pursuing an opposite practice and procuring a speedy reunion, immense advantages are gained in the greater number of cases. Not only indeed has the adhesive process been applied to the restoration of parts partially separated, but several very successful attempts have been made to restore fingers, toes, and other portions of the body, that have been *entirely severed*. These attempts have been founded upon the well known experiments of Duhamel, Hunter and others, of transplanting teeth, and of fixing the spur of a cock into the comb of another, so as to establish between them a complete inosculation and identity. An account of some very interesting cases of fingers restored, after being lopped off and remaining separated for some time, will be found in the tenth volume of the Edinburgh Medical and Surgical Journal. These cases are drawn up by Mr. Balfour, a respectable surgeon, and are well attested by other practitioners. The result should, at any rate, have the effect of

inducing surgeons always to attempt reunion under similar circumstances, whether the process succeed or not, instead of cutting away, as too frequently happens, parts which are hanging by a small portion, under the impression that restoration would be impossible.

See *Hunter on Inflammation*, article *Union by the first Intention*, p. 189—*J. Bell's Discourses on the Nature and Cure of Wounds*; also *Principles of Surgery*—*Thomson on Inflammation*, article *Adhesion*, p. 206—*Carpue's Account of two successful Operations, for restoring a lost nose from the Integuments of the Forehead*—*Balfour's Observations on Adhesion, &c.*—*Jones on Hemorrhage*, article *Ligature*, p. 125 and 166—*Lawrence on a New Method of tying Arteries, &c. in Medico-Chirurgical Transactions*, vol. 6. p. 156—*Veitch's Observations on Secondary Hemorrhage, and on the Ligature of Arteries after Amputation and other Operations, in the Edinburgh Medical and Surgical Journal*, vol. 2. p. 176.





SECTION II.

Punctured Wounds.

PUNCTURED wounds are created by sharp and narrow instruments—such as needles, pins, thorns, splinters of wood, nails, &c. When slight, they are seldom attended with inconvenience or danger. Much, however, will depend upon the situation of the part wounded, and the constitution of the patient. An apparent trifling puncture among tendons, nerves and fasciæ, has sometimes caused *tetanus*. Again,—large *collections of matter* have formed under the fasciæ, producing great distress, and finally permanent contraction or extension of the limbs, by uniting the muscles or their connecting cellular membrane together. Many years ago I attended a young gentleman from the Eastern shore of Maryland, whose forearm was covered with sinuses, from which matter could be pressed in every direction. The fingers were crooked and useless. The disease arose from a very trivial wound made by a needle fixed in the end of an arrow.

The *lymphatics* often swell from punctured wounds. A wound of the foot will frequently cause a swelling of the groin, in every respect resembling the venereal bubo. Punctures of the fingers also, accidents very common in the dissecting room, give rise to similar swellings of the armpit. Several anatomists and students have from this cause lost their lives. A red line may, generally, be traced

over the tract of the lymphatic, from the wound to the enlarged glands.

Needles are sometimes buried under the integuments, or deep in the substance of the muscles. They are seldom productive of ill consequences, and in the course of time work out by approaching the surface. However, I once attended an old gentleman, who died from a needle, which penetrated the great toe immediately under the nail. A case is related by Mr. Carmichael, in which amputation near the shoulder joint was necessary, in consequence of several needles being imbedded in the pronator quadratus muscle, in the periosteum of the radius and ulna and between these bones.*

Treatment of Punctured Wounds.

In a common punctured wound it is seldom necessary to do more than apply a soft poultice to the part for a few days, when the wound will heal without difficulty. But when the part swells, and evident indications of the formation of matter exist, an incision should be made to prevent its extension, and the orifice kept open by a tent or bougie. If nervous symptoms arise, denoting the approach of tetanus, the wound should be freely dilated, and stimulating substances immediately introduced. Opium also must be exhibited in large and repeated doses. Hemorrhage is seldom the consequence of a punctured wound, even if a large ar-

* Dublin Medical Transactions, vol. ii. p. 377

tery be pricked—the opening being too small for any quantity of blood to flow. When needles, or similar substances are buried under the integuments, it is almost impossible to find them. But they should be searched for, immediately after they are introduced, and before they change their position. In some cases they may be readily drawn out by a forceps, and in others may be forced through the skin, by folding up the integuments or muscles around, and pressing opposite each extremity of the needle.

See *Wardrop's Case of Nervous Symptoms from a Punctured Wound* in vol. 7, of *Medico-Chirurgical Transactions*, p. 246; also a similar case, in vol. 4, by *Dr. Denmark*.

SECTION III.

Penetrating Wounds.

THESE wounds are more extensive than punctures, and are generally produced by the small sword, bayonet, or dirk. They may prove dangerous, by entering large cavities, and injuring important blood-vessels, nerves, or viscera; or they may give rise to extensive collections of matter, among the cellular membrane and muscles or under aponeurotic expansions. All penetrating wounds partake more or less of the nature of contused and lacerated wounds—the parts through which they pass being forcibly rent asunder, instead of being separated by a sharp-edged instrument. To this circumstance Richerand attributes the nervous agitation and other ill effects which occasionally result from such wounds.

Treatment of Penetrating Wounds.

The first object, in the treatment of penetrating wounds, is to suppress hemorrhage. This will often be found very difficult, owing to the depth of the wounded vessel, and the narrowness of the passage leading to it. Sometimes, also, the source from which the blood flows cannot be ascertained. Again,—the vessel may be situated between bones, under fasciæ, or among tendons, and cannot be reached

without an extensive and painful dissection. Under such circumstances, we should cut down upon the main artery of a limb, or upon the chief vessel in the neighbourhood of the wound, from which the bleeding derives its source, and secure it by ligature. In some situations pressure may be found very serviceable—as upon the radial artery, in case of wound of the palmar arch, or upon the tibial arteries in wounds of the foot. The plan recommended by Dr. Dorsey should be preferred to any other.* When the wounded vessels are so deeply seated, as in the chest or abdomen, that they cannot be reached, our only resource is to diminish the activity of the circulation by general blood-letting, thereby diverting the stream of blood from the wounded part, and preventing its further effusion.

After inflammation has taken place, severe constitutional and local symptoms may arise. These are owing, not to the partial division of nerves and tendons, as the older surgeons supposed, but to the inflamed muscle being confined

* “I shall mention a plan which I have known successful in stopping the flow of blood from an artery in the foot. The patient was a child in whom several unavailing attempts to tie up the divided vessel had been previously made, and the wound was in a state of great inflammation. A compress was applied over the trunk of the anterior, and another over that of the posterior tibial arteries, about two inches above the ankle: over these a strip of sheet copper was passed round the leg, and a tourniquet was applied over the copper; in this way, when the tourniquet was tightened the tibial arteries were compressed and the bleeding ceased, the copper prevented the tourniquet from compressing any other vessel, so that the circulation in the foot was not interrupted. In a few days the wound healed without any recurrence of hemorrhage. Probably in some analogous cases, similar measures may be found successful.”—*Elements of Surgery*, Vol. I. p. 57.

by a strong and dense fascia, or to inflammation of the fascia itself. These effects are most common after penetrating wounds of the thigh, hip, leg, forearm, bend of the arm, fingers, temple and head, where the fasciæ are numerous, firm and unyielding. The true practice, in all such cases, is to dilate the wound, expose the fascia, divide it freely in a transverse direction, and the urgent symptoms will cease almost immediately. The wound may then be covered with a warm poultice, and in a few hours the thin ichorous discharge which is usually poured out while the nervous symptoms last, will be converted into a thick, yellow, healthy pus. In simple penetrating wounds, unaccompanied by profuse hemorrhage, high inflammation, or constitutional disturbance, there can be no necessity for dilatation. The antiphlogistic regimen, and mild superficial dressings, will answer every purpose. Indeed, in many instances, such wounds heal by the first intention.

See *Charles Bell's Operative Surgery, founded on the Basis of Anatomy.*
vol. 1. p. 7.

SECTION IV.

Contused Wounds.

IN every contusion, more or less injury is sustained by the deeper seated parts, even although the skin remain entire. In general the smaller vessels are ruptured, and blood is poured into the cellular texture or among the muscles, producing an ecchymosis and discolouration. If considerable vessels be torn, a large circumscribed tumour may form, or else the surrounding parts may be extensively injected with blood, giving rise to gangrene from pressure, or to suppuration from irritation. The nerves, also, in contused wounds suffer materially from concussion—the effect being similar to that, although in a less degree, which takes place in injuries of the head. Hence such wounds are at first attended with little pain, but their sensibility afterwards increases in proportion to the extent of the inflammation. A blunt instrument will operate, according to the velocity with which it is carried, or to the resistance afforded by the texture upon which it is applied. For a blow to produce its full effect, the action and reaction should be equal. Where the parts yield, the shock is diminished and the injury is less considerable. Oftentimes it happens that a limb is crushed by machinery, the bones are mashed into small pieces, the joints destroyed, and the vessels bruised or torn, and yet the skin, from its yielding nature, is not divided. An injury of this description is dangerous in the extreme, and gangrene the almost certain consequence. When the skin is cut along with the inter-

nal parts, it is generally owing to the surface of the contusing weapon being not very broad.

Treatment of Contused Wounds.

A simple bruise or contusion should be treated upon common antiphlogistic principles. *Leeches* applied to the part will be found extremely serviceable in subduing the swelling and pain. Cloths dipped in a cold solution of the *acetate of lead*, and constantly applied, will also prove very useful. Perfect rest and relaxation of the muscles are essential.

After the inflammation has subsided, repeated friction with stimulating embrocations, such as the *soap* and *volatile liniments*, by promoting the absorption of the effused coagulated blood, will soon effect a cure. When the extravasation of blood has been too considerable to be taken up by the absorbents, an *opening* should be made in order to evacuate it. In slight cases, however, such an operation should always be avoided. A *roller* applied with moderate firmness will often assist materially in dissipating the swelling, and in preventing œdema, which is always apt to ensue.

Although there is seldom much prospect of uniting a contused wound by the first intention, it should always be attempted, inasmuch as even partial agglutination will serve to keep the edges together, and prevent deformity and other ill consequences. But great care must be taken

not to approximate the sides of the wound too closely, by rollers, adhesive straps or sutures, lest so much pressure and irritation be produced as to bring on gangrene. *Stitches* indeed should, in most contused wounds, be prohibited. When along with the contusion there has been loss of substance, and the edges of the wound cannot be brought together, a poultice moderately warm, and occasionally repeated for a few days, will keep the part easy and promote granulation. Afterwards, simple dressings may be employed. As there is always more or less concussion in every extensive contused wound, blood-letting and other general depleting remedies should be avoided until reaction is completely established. Should symptomatic fever follow, with high local inflammation, the patient must be bled freely, take purgatives, and be kept on a low diet.

SECTION V.

Lacerated Wounds.

ANY obtuse or irregular body, driven with force, may produce a lacerated wound. Machinery in full motion, a cannon ball, splinters of wood, are apt to create very extensive and ragged lacerations. Sometimes a patient falls from a height, and lights amidst sharp and disjointed stones, by which the soft parts are torn and shockingly mangled, and dirt kneaded into them in such a way as to render it almost impossible to wash them clean. In other instances, the scalp is suddenly whirled off by the wheel of a cart or carriage passing over the head. Again—whole limbs are torn from the body by being entangled in machinery. Many such cases are recorded by different surgical writers, especially by Chesselden, Carmichael, La Motte and Morand. Lately an interesting case has been detailed by Dr. Kennedy of India, where a dreadful lacerated wound took place from the bite of a shark. The abdominal muscles were cut asunder and turned back, so as to expose the colon and several convolutions of small intestines; three of the lowest ribs were laid bare, the gluteal muscles torn up, the tendons about the trochanter divided, and the vastus externus and rectus muscles completely separated. A more extensive and shocking wound could hardly be produced, and yet the patient in a few weeks recovered perfectly.

Every lacerated wound is peculiar in this—it bleeds sparingly. However large or numerous the vessels torn

—however extensive or complicated the injury, it will be found universally that the hemorrhage is comparatively inconsiderable. Some years ago I was called to visit a patient at Dorsey's iron works in Maryland, whose right arm above the elbow had been torn off in a mill. Seven or eight hours elapsed before I reached him, and although the arm had been dreadfully mutilated, the muscles torn to tatters, and the brachial artery was gaping with open mouth on the surface of the stump, yet not more than a few spoonful of blood was lost. So extensive indeed had been the shock, and so far had its influence extended, that, in amputating the arm several inches above the torn extremity, hardly any blood was poured out, even when the main artery was cut through in a part apparently sound, and which afterwards healed with great facility. In another instance, a boy in falling from the top of a tree, had the brachial artery, at the bend of the arm, torn completely across by a projecting branch. Scarcely a drop of blood was lost, and in searching for the vessel, some hours after, it could hardly be made to bleed, although repeatedly cut with a view of ascertaining the extent of the injury.

The indisposition manifested by a lacerated part to bleed, is owing to the injury sustained by the nerves, not only in the immediate vicinity of the wound, but to a greater extent around than the eye can discover. Hence the arteries are paralyzed and do not contract to propel the blood, which coagulates in their cavities or among the torn muscular fibres. Hence, also, all lacerated wounds are attended with little pain, are liable to gangrene and to secondary hemorrhage, which is then more dangerous than bleeding produced by sharp cutting instruments.

Treatment of Lacerated Wounds.

In every lacerated wound the attention of the surgeon should be directed first towards the removal of extraneous bodies, and the suppression of hemorrhage if any exist. The edges of the wound should be next loosely drawn together, and retained by adhesive straps. Although we can scarcely calculate upon adhesion to any extent, after such injuries, yet great benefit results from keeping the parts as nearly as possible in their natural situation, inasmuch as fewer granulations will afterwards be required to supply any loss of substance, than if the parts were permitted to recede from each other. Adhesion, however, does in some cases take place to a much greater extent than we could imagine possible, and that too after very severe and extensive lacerations. We should make it a rule, therefore, never to remove any loose hanging portion, under the idea that it must necessarily slough or separate, since this can only be determined by the event of the case. At any rate no harm will result from permitting the wounded parts to remain, even if they be in a gangrenous state, as they must soon separate spontaneously. If much swelling and pain arise after the lips of the wound are approximated, the straps should be removed and the whole surface of the wound covered with a warm poultice, which should be repeated frequently and continued until suppuration is fully established, when the edges may again be drawn together, and generally with decided benefit. After the sloughs have separated and the surface of the wound becomes clean and granulating, simple dressings may be employed.

Very severe constitutional symptoms—as fever, restlessness and delirium, sometimes follow lacerated wounds. These must be subdued by blood-letting, saline purgatives and low diet. But care should be taken not to carry depletion too far or to detract suddenly a large portion of blood, otherwise gangrene, to which at any rate there is generally a predisposition, may be hurried on. Tetanus, moreover, which is very apt to ensue from lacerated wounds, will more readily be induced, if the system has been much prostrated by evacuates. When there is no prospect of healing a lacerated wound, but on the contrary when gangrene is inevitable, then amputation, if the part admit of it, must be resorted to. The surgeon, however, should possess much judgment, to enable him to determine the precise period when the operation should be performed. In particular, he should carefully avoid amputation, so long as the extremities are cold, the pulse weak and fluttering, the wound dry, and the powers of life nearly exhausted. From inattention to these circumstances, I have known four patients lose their lives, who under judicious treatment, might probably have been saved.

But there is another extreme into which the surgeon may fall if not strictly on his guard—the removal of the limb after the circulation has been restored, after fever has commenced and the wound become painful and begun to discharge a bloody serum. A medium should then be chosen, and the moment selected for operation when the powers of life have returned, when the lips have regained their colour, the features their natural appearance, and the extremities a proper warmth.

When patients die from a premature operation, it is owing to the shock communicated to the nervous system, before the vital energy has rallied sufficiently to encounter so severe a stimulus. When they die, after the full restoration of the circulating system and the establishment of febrile action, then life is assaulted through the medium of inflammation and high action, and the operation is almost sure to be followed by gangrene. Each state then, it will be seen, is precarious, and it is only by observing a happy medium that we can expect to succeed. Tetanus in some instances follows very speedily a lacerated wound. In hopes of arresting its progress, some surgeons have advised immediate amputation. I have known the remedy tried in one instance only, but the patient died before the operation was completed. *Immense* doses of opium I believe to be the only alternative under such circumstances.

See in *Pott's Works*, vol. 1. p. 9. a note by Sir James Earle—*Chessel-*
den's Anatomy, case of *James Wood*—*Carmichael*, in *Medical Comm-*
entaries, vol 5—*Morand*, in *Academie de Chirurgie*, tom. 4. p. 141—*La*
Motte, *Traité des Accouchemens*—*Kennedy*, in *Medico-Chirurgical Trans-*
actions, vol. 9. p. 240

SECTION VI.

Poisoned Wounds.

POISONED wounds occur frequently, and are dangerous or otherwise, according to their extent, and the agent by which they are produced. Whether these agents be derived from the animal, vegetable, or mineral kingdoms, they are in many instances equally deleterious. In this country such injuries generally arise from insects, serpents, rabid animals, or from the introduction of morbid matter into the system.

Among the insect class, wounds from the common bee, humble-bee, wasp,* hornet, yellow-jacket, are very frequent, and sometimes productive of high inflammation and pain. Instances indeed are recorded of death, both in human subjects and inferior animals, from the attacks of swarms of these animals. Occasionally death has followed from swallowing a wasp or bee, in consequence of the gullet being wounded by the sting of the animal while passing to the stomach. In this way a young woman in Jersey, a few years ago, lost her life—a bee having been enclosed in a piece of honey-comb which she swallowed.

* Mrs. Day, aged 69, wife of Colonel Day, of Deerfield, Portage county, died in fifteen minutes after receiving the sting of a yellow wasp whilst engaged in drying apples.

The mischief resulting from the stings of bees, wasps, &c. does not proceed from the mechanical injury, but from the acrid liquor infused into the wound by these animals; each of which has a subtle poison contained in a receptacle, situated within the abdomen among the air-vessels, and is furnished with muscles and other apparatus for injecting the wound made by the barbed dart or sting. In the hornet and yellow-jacket this liquor is highly acrimonious, and quickly excites very violent inflammation.

Besides insects of the bee kind, there are several others which occasionally inflict severe and dangerous wounds—the common mosquito, some varieties of fly, certain spiders, the scorpion, &c. In peculiar constitutions the mosquito bite will degenerate into a very troublesome sore, and death has even followed. Dr. Dorsey* states, that he once knew gangrene and death to take place from the bite of this insect, in the case of a lady who previously enjoyed very good health. I am informed by a distinguished naturalist of this city, that numerous instances have occurred at Egg Harbour and other places of similar situation, of cattle being destroyed by the wounds received from these animals. The bite of the green-headed fly, common about Cape May and other parts of the Atlantic coast, is extremely severe; but I have never heard of serious injury from it.

The spider has long been considered a venomous reptile. There is reason to believe, however, that most of the species are harmless, whilst it is certain that in a few instances very severe symptoms and even death have followed from

* *Elements of Surgery*, vol. i. p. 68.

the bites of particular animals of the class. Dr. Mease* mentions an instance of a person who lost his life, from an apparently insignificant wound of one of these insects. The bite of the tarantula, a species of spider common about Naples and many other parts of Europe, was formerly supposed to be extremely venomous and often fatal. Modern observations, however, prove that few ill consequences result from wounds inflicted by these animals. It is very surprising that such men as Geoffroy,† Baglivi,‡ and Mead,§ should not only give credit to the fanciful and ridiculous reports of the supposed operation of the poison of the tarantula, but should even endeavour to account for its specific mode of action and for the imaginary effects of *music* in promoting its cure.—During the expedition up the Missouri under the command of Major Long, Mr. Say and the other naturalists often met with a spider of monstrous size and very hideous appearance; but no opportunities were offered of ascertaining whether it was venomous. M. Morau de Ionnes has furnished a memoir on an enormous spider common at Martinique and its vicinity, which attacks small birds and reptiles, and infuses into the wounds made by its strong jaws a subtle poison which quickly proves fatal.||

The scorpion is a very venomous insect, and often in

* Domestic Encyclopedia.

† Royal Academy of Sciences, 1702.

‡ Baglivi Opera.

§ Mead on Poisons.

|| For an account of the medical properties and bite of the spider, see Lister, *De Araneis Tractatus*; also Berner, *De Araneæ punctura et ejus medela*.

warm climates inflicts a fatal wound. The largest of the species, (*scorpio afer*,) inhabit India, Persia, and Africa, and are much dreaded on account of the activity of their poison, which is contained in a reservoir situated near the tail of the animal, and ejected from two small holes on each side of the tip of the sting. The American Scorpion is not so large as some other species, but is capable of producing by its sting most violent inflammation and sometimes death. From a number of experiments performed on dogs and other animals by Maupertius,* it appeared that the sting of the scorpion caused the whole body of the wounded animal to swell, and was productive of violent retching convulsions and death. In other instances no inconvenience whatever followed from the stings of these insects. "I have frequently seen," says Mr. Allan, "the sting of the scorpion followed by violent inflammation and swelling, similar to those of bees and wasps, only in a more aggravated degree. In the years 1803 and 1804, I had many opportunities of witnessing wounds inflicted by the sting of the scorpion on board of La Dianne frigate. She was one of those French ships which escaped from the battle of the Nile, but was afterwards captured by the British when coming out of Toulon. In August, 1803, she was commissioned at Plymouth, and taken into the service of the British navy. Having been long in the Mediterranean while in the French service, the scorpion had got on board. From the coldness of our climate the insect had lost its vigour, and lay concealed behind the lining, in the seams, betwixt the timbers, and in other parts of the ship; but no sooner had the ship gone to sea, and proceeded to the south-

* Mem. de l'Academie des Sciences, 1731.

ward, than it was found that she was literally swarming; the heat renewed their activity, they crawled forth from their lurking holes and stung many of the men. The wound was always followed by violent and extensive inflammation, considerable swelling, and great pain; but I never observed any violent constitutional symptoms succeed to the local.”*

Of the numerous American serpents two species only are known to be venomous—the *rattlesnake* and *copper-head*. Eight species of the former have long been familiar to naturalists, and two others have been discovered lately by Humboldt† and Bonpland. All are poisonous, but in particular the *crotalus durissus*, *horridus*, and *miliarius*. The copper-head, (*boa crotaloides*,) sometimes called the bastard rattlesnake, is also exceedingly malignant. All these reptiles are furnished with long teeth, or poisonous fangs, the roots of which are surrounded by a bag or reservoir containing an active and virulent poison. This poison is discharged into the wound through a small fissure of the tooth situated near its extremity, and in many instances very quickly proves fatal both to man and to the inferior animals. As regards the effects of the poison, much will depend upon the size of the animal bitten—death being produced more readily in the smaller than in the larger animals. According to the experiments of Vosmaer, sparrows, finches and other small birds died in about four minutes, while a mouse died in a minute and a

* Allan's System of Pathological and Operative Surgery, vol. i. p 370.

† These are the *Crotalus Cumanensis* and the *Crotalus Læflingii*. See Recueil d'Observations de Zoologie et Anatomie Comparee, 4to.

half. The deleterious operation of the poison will also depend materially upon its quantity, and upon the season of the year at which the wound is inflicted. To ascertain the effect of the bite of the rattlesnake, several experiments were made by Captain Hall of Carolina, upon dogs, cats, chickens and frogs. Three dogs were bitten in succession by a snake four feet long. The first died in less than a quarter of a minute, the second in two hours, and the third in three hours. Four days after, two other dogs were bitten; one of which died in half a minute, the other in four minutes. Several experiments nearly similar, were made by the late Professor Barton on chickens. Of three chickens bitten, on three days successively, one died in a few hours, another lived much longer, and the third recovered after having been exceedingly swelled. On the fourth day, several other chickens were bitten, but recovered without a bad symptom.

The rattlesnake is more lively, and its venom more active, during very warm weather than at any other period: upon the approach of the cold season, it becomes languid, and then strikes reluctantly, and frequently without any ill consequence. The effects produced by the poison either on the human body or on the lower animals, vary according to the parts wounded, the depth to which the fang penetrates, and the quantity and strength of the venom in the reservoir. In many instances death follows in a few seconds or minutes, and in others not until many days or weeks. The interesting case detailed by Sir Everard Home, which I witnessed whilst a student in London, furnishes striking proof of the speedy operation of the poison of the rattlesnake, and at the same time affords incon-

testable evidence that it may remain a long time in the system before death is produced. The patient was teasing a large rattlesnake with the end of a foot rule, but could not induce the animal to strike; the rule accidentally dropping from his hand, he opened the door of the cage to take it out; the snake immediately darted at the hand, and inflicted four wounds—two on the back part of the first phalanx of the thumb, and two on the side of the second joint of the forefinger. The hand soon after began to swell, and in the course of ten or eleven hours the whole arm, axilla and shoulder were very much tumefied and cold. There was an unusual coldness also throughout the skin of the whole body. At this period the mind of the patient was perfectly collected; but immediately after the accident he talked incoherently, owing probably to strong drink, which it was ascertained he had taken before he was bitten. From the axilla the swelling extended down the side, and blood was extravasated under the skin as far as the loins, giving the back a mottled appearance. The skin over the whole body became warm, faintings occurred repeatedly, vesications appeared in different parts of the body, a large abscess formed on the outside of the elbow and discharged half a pint of reddish matter; mortification took place in the axilla, in the forefinger and some other parts, and finally destroyed the patient, after he had laboured for eighteen days under the most distressing symptoms. Upon dissection the body presented a natural appearance, (with the exception of the arm that had been bitten,) and the wounds made by the fangs of the reptile had healed.

Instances have occurred, both among the Indians and among the white people, who inhabit the mountainous and

thinly settled parts of our country, of almost instantaneous death from the bite of the rattlesnake. On the other hand, it is very certain that many persons wounded by this animal have sustained very trivial injury, if any. In such cases, it is probable that the teeth enter obliquely and do not penetrate the true skin, or that the reservoirs at the roots of the fangs have been empty, or the virus itself, owing to particular circumstances, so modified or changed in its properties or in such small quantity as not to produce fatal effects. Again,—where death has followed almost immediately or shortly after the wound, the poisonous fangs have probably penetrated directly a considerable artery or vein, and conveyed the noxious matter at once into the circulation. According to Catesby, the Indians very soon ascertain when this has happened, and, under an impression that the wound is necessarily fatal, apply no remedy. Upon these principles it will be easy to account for the supposed good effects of the numerous and diversified remedies, at different times proposed for the cure of the bite of the rattlesnake; inasmuch as there is reason to believe that nature, unassisted, is often sufficient to accomplish a cure, or that a sufficient quantity of virus has not been inserted to produce death.

The poison of the rattlesnake is of a yellow colour tinged with green: during extreme heat, and particularly in the procreating season, it becomes of a much darker hue. The *copper-head* is equally poisonous with the rattlesnake, but few experiments have been made to ascertain its peculiar characters.

In Europe the viper is more dreaded than any other poisonous reptile: it would appear, however, to be less

deadly than the rattlesnake, and according to Fontana (who has studied its history more than any other naturalist, and who has instituted a great number of experiments in order to become acquainted with the operation of its virus,) produces injury or death in proportion to the size of the animal bitten and to the depth of the wound—small animals dying almost immediately, and wounds penetrating beyond the skin being equally fatal.

The natives of India often suffer from the bites of the numerous species of *Coluber*, particularly from the cobra de capello, (*Coluber naja*,) which is extremely venomous. In many parts of the Eastern continent, the three Arabias and Africa, the *cerastes* or horned viper is extremely numerous, and often by its bite proves fatal. According to Bruce, however, the black people in the kingdom of Sennaar are perfectly armed against its bite. "The Arabs," says he, "have this secret naturally, but from their birth they acquire an exemption from the mortal consequences attending the bite of these animals, by chewing a certain root and washing themselves with an infusion of certain plants in water. One day when I was sitting with the brother of Shekh Adelan, prime minister of Sennaar, a slave of his brought in a *cerastes*, which he had just taken out of a hole and was using with every sort of familiarity; I told him my suspicion that the teeth had been drawn, but he assured me they were not, as did his master Kitton, who took it from him, wound it round his arm, and at my desire ordered the servant to carry it home with me. I took a chicken by the neck and made it flutter before him; his seeming indifference left him, and he bit with signs of anger: the chicken died almost immediately;—I say indif-

ference, for I constantly observed that however lively the viper was before, yet upon being seized by any of these barbarians, he seemed as if taken with sickness and feebleness, frequently shut his eyes and never turned his mouth towards the arm of the person who held him. I will not hesitate to aver that I have seen at Cairo, (and this may be seen daily without trouble or expense,) a man who came from above the Catacombs, where the pits of the mummy birds are kept, who has taken a cerastes with his naked hand from a number of others lying at the bottom of the tub, has put it upon his bare head, covered it with the common red cap he wears, then taken it out, put it in his breast, and tied it about his neck like a necklace; after which it has been applied to a hen and bit it, which has died in a few minutes; and to complete the experiment, the man has taken it by the neck, and beginning at the tail, has ate it as one would do a carrot or stock of celery, without any seeming repugnance.”*

Wounds from the bites of rabid animals are not always followed by *rabies canina* or *hydrophobia*; indeed it has been well ascertained, that out of numerous persons bitten by dogs undoubtedly mad, very few have sustained material injury. This is owing, probably, to the human system being less susceptible of impression from the virus than that of the lower animals, and to the circumstance of the greater part of the body being covered by clothes, by which the infectious matter is wiped from the teeth, and thereby prevented from entering the wound in sufficient quantity to produce its full effects—to the teeth of the rabid

* Bruce's Travels, octavo edition, vol. vii. p. 302.

animal not penetrating deep, or not striking a vascular part—to the saliva or venom being in smaller quantity in the animal's mouth at one time than another—and to an *erythismus* in the lymphatics of the wounded part sufficient to prevent the absorbent action. Dr. Hunter relates an instance of twenty persons bitten by the same mad dog, and out of that number only one took the disease. According to an estimate made by Dr. Hamilton, founded upon numerous facts, about one in every sixteen of the human species bitten by mad dogs, take the infection and suffer from the consequent disease.

Great doubts still exist respecting the peculiar nature or mode of action of the virus, in giving rise to rabies canina. Mr. Cline instituted a number of experiments to ascertain whether the saliva of a hydrophobic man, in the last stage of the disease, could, by inoculation or other means, infect the inferior animals, so as to propagate the complaint; but none of the animals into whom fresh saliva was inserted were in the slightest degree affected, even at the end of three months. It would appear also, from some experiments by Sir Astley Cooper, that the saliva of a mad dog, inserted by a lancet into the inside of the thigh of a dog, a pig, a rabbit and fowl, produced no deleterious effect whatever; notwithstanding some of the animals were kept from nine weeks to twelve months.

Between the infection and the appearance of the constitutional disease, the interval is often very various and uncertain. In general, the attack does not commence until after the lapse of thirty or forty days; in some instances no signs of the disease have appeared for twelve or eighteen

months, and in one case recorded by Dr. Bardsley, the patient remained perfectly well for twelve years and then died from the disease. These facts would seem to prove that the system is affected through the medium of absorption, and not from any influence exerted by the virus upon the extremities of the nerves of the part,—an opinion formerly entertained. The wound made by the teeth of a rabid animal heals with as much facility as any other wound, and often is entirely obliterated, long before the constitutional symptoms have appeared. It has been observed, however, that when any constitutional disturbance takes place, before the closure of the wound, then instead of continuing to granulate and discharge a healthy pus, the sore puts on a sloughy character and the matter becomes thin and ill conditioned.

The *symptoms* of rabies canina vary very much according to the constitution of the patient; in general, some uneasiness, soreness or itching is first felt at the wounded part; the spirits of the patient are depressed, and he oftentimes suffers from indescribable anxiety. Occasionally a chill or rigor is the first symptom manifested. At night the patient's sleep is disturbed by frightful dreams and by spasmodic startings; the pulse is quick and fluttering; the appetite fails; but the thirst is increased. At this period it is generally observed, that when the patient attempts to drink he is immediately seized with a sudden and spasmodic catch in the breathing, which is increased upon repetition, and finally is attended with indescribable horror and universal agitation. The very idea or thought of *liquids* is afterwards sufficient to excite the same painful and distressing symptoms, and should the patient have resolution

enough to attempt to swallow, or to struggle against the spasmodic and agonizing contractions of the muscles of the throat, the whole system becomes so convulsed, that he finds it impossible to accomplish his purpose. This fear of water, or *hydrophobia*, is not, however, an universal concomitant of the disease; in many instances it is altogether absent; it is, moreover, an attendant upon other diseases, not in the slightest degree allied to canine madness. But in the worst forms of the complaint it is for the most part present, and of all the individual symptoms by far the most horrible and appalling.

A symptom, less constant than those mentioned, but sometimes very distressing, is a collection of thick, viscid, ropy phlegm, which adheres to the fauces and throat so closely, that the patient finds it extremely difficult and often impossible to throw it out; although the most vehement efforts are employed for the purpose. In a patient attended by Dr. Marcet,* the quantity of this tenacious lymph was so considerable, and ejected with such extreme torture, that he exclaimed, "Oh! do something for me; I would suffer myself to be cut to pieces! I cannot raise the phlegm; it sticks to me like birdlime."

In the latter stages of hydrophobia the pulse becomes exceedingly agitated and hurried, and the breathing very quick and laborious; the countenance is expressive of great anxiety and fear, the eyeballs glare and seem ready to start from their sockets, and the muscles of the face and neck are horribly contorted. Sometimes the patient becomes

* Medico-Chirurgical Transactions, vol. i.

altogether furious and unmanageable, and attempts to tear and bite himself and every one near him; but in general he is perfectly inoffensive, and answers questions with great precision and in the most rational manner. He seldom lives beyond the fourth or sixth day, and is either carried off suddenly by a violent convulsion, or expires quietly—his bodily vigour being completely exhausted by inordinate exertions and continued suffering.

The introduction of morbid matter into the system, is sometimes *apparently* productive of the worst consequences. Persons much engaged in the dissection or examination of putrid bodies, or in macerating or making preparations, have occasionally suffered from wounds of the scalpel or dissecting hook, or from punctures made by spicula of bone, &c. In such cases violent inflammation has followed, extending up the arm as high as the axilla or neck, rendering the whole limb exceedingly tense and painful, and finally producing extensive abscesses, sometimes gangrene, and sometimes death. Examples of this kind have been recorded by different writers. Mr. Fyfe, the celebrated anatomist at Edinburgh, informed me that he nearly lost the use of one arm for several years, owing to a wound of the finger by a dissecting knife. Dr. Chambon of Paris, in attempting to separate a sphenoid bone, which had long remained in maceration, from the other bones of the head, received so severe a wound in one of the fingers as to keep him on the brink of the grave for upwards of three years.* Corvisart,† also, in examining a dead body pricked a finger, in consequence of which the whole arm swelled enor-

* Dictionnaire des Sciences Medicales, tom. ix. p. 649.

† Ibid.

mously, and was only relieved by very extensive incisions performed by Desault. Percy relates the case of a student who died, in three days, from dissecting a body which had been kept for several weeks. Mortification took place in the wounded finger, and extended rapidly throughout the arm. Professor Le Clerc is said to have lost his life from touching, with a sore finger, the pulse of a patient in a profuse perspiration, who laboured under a malignant fever. Dr. Rush mentions an instance of a young man who died from a wound he received in skinning an ox.* But none of these examples furnish direct evidence of the absorption of morbid virus; since many others might be adduced to show that the same symptoms have followed from apparently trifling injuries, and under circumstances where no virus could possibly have been absorbed. Dr. Physick informs me, that he once attended a patient who died from gangrene of the whole arm, simply from a slight scratch of the shell in the act of opening an oyster; and I have known a puncture from a needle in one of the fingers produce nearly throughout the arm most violent inflammation and suppuration. In all probability, then, a simple punc-

* Within the last three or four years several interesting cases have been detailed in which surgeons and medical students have lost their lives, or been reduced to the lowest extremity by slight wounds, received in the dissection or examination of dead bodies. Among these may be mentioned the names of Professor Dease, of Dublin, Dr. Pett and Mr. Newby, of London, Mr. Gerard, professor of the veterinary school of Alfort, Messrs. Elcock, Shekelton, Graves, Archer, and Hutchinson, students of medicine, all of whom perished in a few days, after having suffered beyond description. Other cases are recorded, too, and these by no means few in number, in which the patients thus wounded, have, though with great difficulty, recovered after the lapse of weeks or months.

ture, in certain constitutions, is capable of producing effects which might easily be attributed to the operation of some specific virus. This conclusion is rendered more probable from what we know to happen in tetanus, which is sometimes produced by the most insignificant scratch, and at other times cannot be excited by the most extensive laceration.*

Treatment of Poisoned Wounds.

It seldom happens that the stings of bees and wasps are so severe as to require active remedies for their cure. In general local applications afford speedy relief. A solution of common salt, applied to the part, will produce almost instantaneous ease. This remedy was first introduced, it is said, by Dioscorides, and has since been found serviceable even in wounds of the œsophagus. An English gentleman saved the life of his friend, who had swallowed, unperceived, a wasp in a glass of beer, by causing him to drink plentifully of salt and water.† The *aqua ammoniæ*, applied to a part stung by bees, I have often known to act like a charm. Cold water, rose water, a solution of the acetate of lead or of opium, constantly applied, will in many instances soon cause the pain and inflammation to subside. Bleeding and purging, with strict antiphlogistic regimen, will probably become necessary when the patient has suffered from a swarm of bees. The same remedies will be

* For various illustrations and numerous interesting cases and observations respecting the effects of poisoned wounds, see TRAVERS on "*Constitutional Irritation*."

† Dictionnaire des Sciences Medicales, tom. i. p. 40.

found equally useful for the bites of spiders, flies, mosquitoes and other insects.

In Morocco, where the scorpion is very common, most families keep a bottle of olive oil, in which the bodies of several of these reptiles have been infused, and when bitten apply it to the wound, and with reputed success. A ligature, moreover, is generally placed above the wounded part, to interrupt the progress of the poison, and the wound is afterwards scarified and cauterized. "In Tunis, when any person is stung by a scorpion," says Mr. Jackson,* "or bit by any other venomous reptile, they immediately scarify the part with a knife and rub in olive oil as quick as possible, which arrests the progress of the venom. If oil is not applied in a few minutes death is inevitable, particularly from the sting of a scorpion. Those in the kingdom of Tunis are the most venomous in the world." According to the same author, the *coolies* or porters, who work in the oil stores, have their bodies constantly saturated with oil, and on this account not only never suffer in the slightest degree from the bites of scorpions and other reptiles which creep over them at night as they sleep on the ground, in great numbers; but there is not a single instance known of one of these people ever having taken the *plague*, although the disease frequently rages at Tunis in the most frightful manner.

The use of olive oil has been highly extolled by many writers as a remedy for the bites of poisonous serpents.

* Jackson's Reflections on the Commerce of the Mediterranean. London, 1804.

Dr. Miller* of South Carolina relates the case of a man who was bitten in the sole of the foot by a very large rattlesnake. Although very little time elapsed before he reached the patient, his head and face were prodigiously swelled, and the latter black. "His tongue was enlarged and out of his mouth; his eyes as if starting from their sockets; his senses gone, and every appearance of immediate suffocation." Two table-spoonsful of olive oil were immediately got down, but with great difficulty. The effect was almost instantaneous; in thirty minutes it operated freely by the mouth and bowels, and in two hours the patient could articulate, and soon after recovered. The quantity of oil taken internally and applied to the wound did not exceed eight spoonsful. In the course of twelve years Dr. Miller has met with several similar cases, in which the oil has proved equally successful. Mr. Olivert has detailed a number of experiments in proof of the efficacy of warm oil, when applied to the wound made by the bite of the viper; but Linnæus† found it quite inefficient.

The *volatile alkali* was, for a long time, in very general use as an antidote against the poison of different serpents; but the experiments of Fontana are calculated to show, that so far from being useful, the symptoms produced by the bite of the *viper* were increased either by the internal exhibition of the medicine or by its external application. On the other hand, the late Dr. Ramsay§ of South Carolina, one of the most distinguished physicians our country

* New York Medical Repository, vol. ii. p. 242.

† Philosophical Transactions, vol. xxxix. p. 310.

‡ Amœnitates Academicæ, vol. xi. p. 407.

§ London Medical and Physical Journal, vol. xi. p. 332

can boast of, has subsequently declared "that the *volatile alkali*, properly administered, will in a short time cure the bite of any snake, or the sting of a spider, or any other venomous insect, is a medical fact as well established as that the Peruvian bark will cure an intermittent fever." Dr. Ramsay's declaration is founded upon the result of several cases, wherein patients have suffered from the bites of rattlesnakes, and have been cured, apparently, by the volatile alkali. We are strongly inclined to the opinion, however, that the injuries received were not, independently of the action of the remedies employed, sufficient to cause the patient's death, or in other words, that spontaneous cures, which we know to be very common, took place. The same remarks may perhaps apply to the cases detailed by Dr. Anderson* of Madrass, respecting the cure of the bite of the cobra de capello, and by Dr. Brichell† of Savannah, of the rattlesnake and mochison, by means of alkalies. In the latter case the patient probably would not have died, as it is well known to naturalists that the *mochison* is not a venomous serpent.

As an internal medicine, *arsenic* has been lately found more decidedly beneficial than any other. Mr. Ireland‡ has recorded five cases, in all which the most violent symptoms produced by the bite of the *coluber carinatus*, a poisonous serpent very common at the island of St. Lucia, were, by the use of this medicine speedily arrested. The supposed efficacy of the Tanjore pill, a medicine very commonly employed in India against the bites of serpents, the chief ingredient of which is arsenic, first led Mr.

* Medical Repository, vol. ix. p. 109. † Ibid. vol. viii. p. 441.

‡ Medico-Chirurgical Transactions, vol. ii. p. 394.

Ireland to employ Fowler's mineral solution. He gave it to the extent of two drachms every half hour, and repeated for four hours, with the best effects. Severe vomiting and purging followed the administering of the medicine, and the patients were soon after relieved.

When a person has been bitten in the extremities by a serpent supposed to be poisonous, a ligature should immediately be thrown around the limb above the wound, and drawn exceedingly tight in order to interrupt the progress of the venom through the absorbents: after this a portion of flesh, for some distance beyond the wound, should be quickly removed by the knife; then the kali purum, the lunar caustic, or the actual cautery, must be applied until an eschar is produced. The wound should afterwards be dressed with some simple ointment. With regard to internal medicines no objection can arise to the exhibition of oil, volatile alkali, or Fowler's mineral solution; for, if useless, they cannot at any rate prove injurious, and upon this principle should be tried.

As *hydrophobia* may still be considered an incurable disease, the great object of the surgeon must always be to secure the patient against its attack. Fortunately this can be accomplished, in many instances, by removing the bitten portion of flesh as speedily as possible after the accident, and in some cases even after weeks have elapsed and the wound has healed. Whenever, therefore, we are called to a patient, who has been bitten by a dog or any other animal supposed to be mad, such incisions should instantly be made as will include a portion of flesh greater than the depth to which the teeth of the animal have extended. This operation should

be performed, were it only by way of precaution, or in cases where no absolute certainty has existed of the animal being mad. If the surgeon is timid and cuts sparingly, there will be much reason to apprehend that the operation will not prove successful. In general, owing to several teeth penetrating at the same time and at different parts, it will be necessary to remove several distinct portions of flesh. Should the teeth perforate between the bones of the hand or foot, as often happens, so as to leave insufficient room to remove all the injured soft parts, our only resource will be to amputate without delay. By way of security, after the incisions have been practised and the bleeding suppressed, it will be advisable to apply to the wounds the lunar caustic, the kali purum; or what is still better, equal parts of white arsenic and sulphur, a remedy introduced by Mr. Cline, and extolled by Sir Everard Home as extremely valuable in cancer, and which experience has proved to be the most powerful caustic employed in surgery. By adopting these measures, we shall often have the satisfaction to find the fears of our patient allayed, or the disease consequent to the bite of rabid animals entirely prevented. The same operations should be resorted to, after months have elapsed without any thing having been done for the patient, provided the cicatrix becomes sore or painful and indicates the approach of the disease. When any doubt exists of the animal being mad, instead of having it killed as soon as possible, as is generally done, it should be confined until the symptoms become so clear as to remove or confirm all suspicion on the subject.

When our operations fail and rabies canina is established, then various remedies may be tried. Of these opium, mer-

cury, cantharides, volatile alkali, belladonna, musk, arsenic, camphor, lunar caustic, the cold bath and blood-letting, have been considered the most powerful. Blood-letting, carried ad deliquum animi, has lately been extolled in the highest terms by Mr. Schoolbred of Calcutta, and some facts have been adduced by Mr. Tymon, assistant surgeon of the 22d English light dragoons, which go to prove that taking away, at once, an immense quantity of blood, so that scarcely a pulsation can be felt in either arm, has been attended with the most favourable result.* According to Professor Brugnatelli,† several cases of hydrophobia have been cured in the hospitals of Lombardy, by the external and internal use of hydrochloric acid. Dr. Physick,‡ some years ago, proposed, under the idea that many patients labouring under hydrophobia, died from suffocation caused by spasm of the muscles of the glottis, to open the trachea in order to sustain the breathing, until the effects of different remedies could be fully tried. I do not know of any instance in which the experiment has actually been performed; but am strongly inclined to believe, from the termination of numerous interesting cases, recorded by different writers, in which the chief symptom was a difficulty of breathing and swallowing, to such a degree as apparently to destroy the patient, that decided benefit would result from the practice. Under this impression, should a case present, I would perform the operation of tracheotomy, or else introduce a gum elastic catheter into the glottis and trachea. It is well known that such an instrument may be

* See Cooper's Surgical Dictionary, edit. 4th, p. 611.

† Eclectic Repertory, vol. viii. p. 256.

‡ Medical Repository, vol. v. p. 1.

carried into the larynx, and there suffered to remain for any length of time, without exciting any unpleasant symptom, except a violent and convulsive cough at the moment of its passage through the glottis.

As respects the *treatment* of wounds received in dissection, much diversity of opinion prevails even amongst the most distinguished members of the profession. Some are inclined to trust mainly to the antiphlogistic system, to saline medicines, calomel, antimony, opium, and the local application of lunar caustic. Such is the plan recommended by *Sir Astley Cooper*. *Mr. Travers* objects to the caustic unless applied immediately after the receipt of the injury, and seems inclined in most cases to prefer the stimulating to the depressing plan of treatment. But he is an advocate for soothing applications and for poultices after the parts have been freely divided in the course of the wound by a sharp lancet. According to *Mr. Shaw*, the most effectual mode of reducing the inflammation of the lymphatics is to "apply lint soaked in the sugar of lead lotion and tincture of opium to the arm, and to take calomel purges, and large doses of opium with plenty of wine and porter." The same gentleman recommends that the finger be wrapped in lint dipped in equal parts of Goulard's lotion and laudanum, and advises to lay open the injured part to the bone when there is reason to believe that matter has formed.

Fortunately for the profession in this country, injuries from dissection are extremely rare. This may probably be owing in part to the abundant supply of fresh subjects every where to be obtained in the large towns, owing to which students are seldom under the necessity of using

such as are decayed or in a diseased state. On this account too, our knowledge of the treatment of such injuries must be comparatively limited. But much, we are inclined to believe, may be done in all such cases by way of prevention. Professor Chaussier, of Paris, has long been in the habit of advising that each student should carry a vial of butter of antimony in his pocket, and apply a portion of it to the wound immediately after its receipt. Others, with the same view, commend the nitric or muriatic acid. Others, again, by way of prevention, direct the hand to be covered with oils, pomatum, &c. or with gloves. Would not suction by the mouth, or the cupping-glass answer in most cases, if employed immediately after the injury?

Within the last two years, some very interesting and satisfactory experiments have been performed in relation to the pathology and treatment of poisoned wounds. From the result of these, it appears beyond all doubt, that the old remedy, the *cupping-glass*, commended by Hippocrates, Celsus, Galen, and others, may be employed to a certainty in the removal of poisons from wounded surfaces or cavities, provided it be resorted to in time, and continued sufficiently long. For the knowledge of these facts the profession is greatly indebted to Dr. Barry.* The following extract will exhibit satisfactorily the whole treatment pursued by this eminent practitioner.

* *Experimental Researches on the Influence exercised by Atmospheric Pressure upon the Progression of the Blood in the Veins, upon that Function called Absorption, and upon the Prevention and Cure of the Symptoms caused by the Bites of Rabid or Venomous Animals, &c.* By David Barry, M. D. London, 1826. 8vo.

1st. " In all cases of superficial poisoning when the deleterious matter is simply deposited in the wound, the application of the cupping-glass over the point of contact will save the individual, provided it be made with the precautions to be noticed hereafter, and before a dose sufficient to cause death shall have been absorbed. 2d. In cases where the poison has been injected, as, for instance, by the hollow fang of a viper or rattlesnake, though the cupping-glass may have been applied, yet as the local action of the venom goes on in vacuo, the parts acted upon should be cut out after the venom has been concentrated and partly extracted by the cupping-glass, which should be immediately re-applied over the wound made by the knife, for the purpose of extracting the contents of the newly-divided vessels from a greater distance than could be done before the operation. After this the actual cautery may be administered, if thought necessary; but never under any circumstances before the second application of the cupping-glass, for this reason—that when the mouths of the vessels are hermetically sealed by the hot iron, they can give out nothing to the vacuum. 3d. The poisoning that results from the bite of a mad dog, so far as regards the simple deposition of the deleterious matter in the wound, and the total absence of local action upon the wounded tissues, comes strictly under the first or least complicated class of cases. But the tardiness with which the poison is absorbed, or if absorbed, with which it produces its peculiar effects, entitles it to be considered as a species *sui generis*. Fortunately this anomaly does not alter the preventative indications. These are purely physical, and as such must be ever unvaried. The first thing, then, to be done in treating the recent bite of a rabid dog, is to apply a powerful cupping-glass over

the wound. This measure supersedes at once the ligature, ablution, excision, &c. during the period of its application, and for a certain time after its removal. After the cupping-glass has been applied for an hour *at least*, the whole of the parts wounded or abraded by the bite, should be freely dissected out. The cupping-glass should then be re-applied immediately for the reasons already stated. The wound should next be hermetically sealed by the actual cautery. The part should be as little exposed to the contact of the air after the slough comes away, and as soon healed up as possible.”

On wounds from Insects, consult *Dictionnaire des Sciences Medicales*, tom. 1. p. 40. article *Abeille*; also tom. 25. p. 315—*Richerand's Nosographie Chirurgicale*, tom. 1. p. 104.

On the bites of Serpents, *Fontana on Poisons*—*Barton on the Rattlesnake*, in *American Philosophical Transactions*, vol. 3—*Home*, in *Philosophical Transactions*, part 1st. 1810.

On Hydrophobia, see *Hunter*, in *Transactions of a Society for the Improvement of Medical and Chirurgical Knowledge*, vol. 1—*Hamilton on Hydrophobia*, vol. 1—*Cline*, in *Medical Records and Researches*—*Bardsley*, in *Memoirs of the Literary and Philosophical Society of Manchester*, vol. 4—*Rush's Inquiries*—*Ferriar's Medical Histories and Reflexions*—*Fothergill*, in *Medical Observations and Inquiries*, vol. 5—*Vaughan's Cases and Observations on Hydrophobia*—*Latta's System of Surgery*, vol. 5—*Mease on the Bite of a Mad Dog*—*Physick*, in *New York Medical Repository*, vol. 5.

On Wounds from Dissection, consult *Travers on Irritation*—*Sir Astley Cooper's Lectures* by *Tyrrell*—*Colles's Fatal Consequences resulting from Slight Wounds received in Dissection* in *Dublin Hospital Reports* vol. 3—*Shaw's Manual of Anatomy*—*Shaw on Dissection Wounds* in the *London Medical and Physical Journal*—*Thomson on Dissection Wounds* in *London Medical Repository*—*Duncan*, *Cases of Diffuse Cellular Inflammation*, in *Transactions of Medico-Chirurgical Society of Edinburgh*, vol. 1.

SECTION VII:

Gun-shot Wounds.

UNDER the head of gun-shot wounds are comprehended all injuries from fire arms, from explosion of shells, rockets, &c. Wounds of this description are oftentimes extremely formidable—destroying the patient immediately or remotely, producing extensive mutilation, or giving rise to abscesses, sinuses, and diseased bones, which last for months or years, or perhaps during the patient's life. The kind and extent of injury must depend, however, upon the form and size of the instrument inflicting the wound, upon the velocity with which it is carried, and a variety of other circumstances. A ball moving with great rapidity and striking the body, enters readily and pursues its course generally in a straight line, either passing through the part or lodging at a greater or less depth. On the contrary, a ball which moves slowly enters with difficulty, and, instead of following a direct line, is diverted by the slightest obstacle—always taking an angular course. Owing to this circumstance, it often happens, that a bullet strikes some part of the body, and apparently passes through; but upon examination it will be found, that it has taken a circuitous route—having followed the course of a rib, or traversed the head between the bone and scalp, or passed entirely around the abdomen or neck. In other instances the ball strikes an extremity, runs beneath the skin, or among the

muscles, and is lodged many inches, or even two or three feet beyond the point at which it entered.

The opening, made by a ball where it passes out, is always larger and more ragged than that by which it entered—because it passes from the body, which is a *dense* medium, into the air, which is a *rare* one. On the other hand, the contusion is greater at the place the ball enters, than at that from which it emerges—owing to the velocity of the ball being more considerable when it first strikes, than it is afterwards; hence the first opening is small, round, comparatively insensible and discoloured, not unfrequently casts off a slough, and seldom heals except through the medium of granulation: whilst the last, approaching to the nature of an incised wound, is inflamed and painful, and often heals by the first intention. Two openings, however, are not invariably found, for in many instances the ball does not pass through, but lodges in the substance of a muscle, or in a bone, or immediately under the skin. In other instances it carries before it the clothing, which, according to its texture, is either torn or remains entire. In the latter case, upon withdrawing the cloth, the ball is generally discharged with it. Other extraneous matters besides cloth, may be carried before a bullet, and deeply lodged—such as splinters of wood, buttons, pieces of coin, keys, &c. These always excite more or less irritation. The bullet itself will create as little injury as any other foreign body, provided it remain smooth and round; but if it is flattened or angular, or incrustated with spicula of bone, or in any other manner rendered rough or pointed, great pain and profuse suppuration will generally follow.

Balls are frequently buried and never found. Sometimes they remain stationary, being either enclosed in a cyst or surrounded by a bone, and the patient feels no inconvenience from them. At other times they change their position, and travel to a considerable distance, exciting, during their passage, pain and suppuration, and occasionally violent spasms. Not unfrequently they approach the skin and are discharged spontaneously. Balls are sometimes divided by striking the edge of a sharp bone, in which case each portion usually makes a passage for itself. I have met with several examples of the kind. The veteran M'Culloch, who signalized himself at the battle of North Point, had his thigh broken by a bullet, which was divided by the bone as completely as if effected by a knife or chisel.

A ball moving with great velocity and encountering a bone, passes through it in an instant, making a round and comparatively smooth opening. If the ball move slowly, however, or be nearly *spent*, it will be apt to produce extensive fracture or fissure. In some cases of this kind the cylindrical bones have been splintered more than two-thirds of their length.

Gun-shot wounds, like all other contused wounds, seldom bleed profusely—the vessels, being torn with violence, retract and bury themselves among the cellular membrane. Even very large arteries may be torn across, without shedding more than a few drops of blood;* but a vessel partially

* It must be understood, however, that when arteries of the largest class, such as the carotid or femoral, are cut by a bullet, the patient dies almost instantly.

torn will throw out more blood than one which has been completely separated. Although the vessels bleed sparingly when first wounded, in a few days secondary hemorrhage is very apt to ensue, from the detachment of the slough with which almost every tract made by a ball is lined; and from this cause many patients have suddenly lost their lives. A regular slough or dead tube completely formed, is not so invariable a consequence as many surgeons imagine. I have met with several cases where no vestige whatever could be discovered of a slough from the commencement to the termination of a wound. When a slough does form, it is liable to be detached at some period between the *fifth* and *twelfth* day, and during this period the patient should be closely watched. It happens frequently that an artery is merely brushed by a ball, and yet its coats are so much injured that in a few days an eschar separates from it, and gives rise to profuse hemorrhage. In other cases large arteries are pushed entirely to one side by the passage of balls, without sustaining the slightest injury. This happened, there is reason to believe, to Captain Worth,* a gallant young officer, at the battle of Bridgewater, who received a shocking wound in the thigh by a grape shot, several ounces in weight, which penetrated a little below the groin over the course of the femoral artery, and tore up the muscles in a frightful manner, without injuring the vessel.

The nerves suffer immensely in some gun-shot wounds, especially those of the extremities. Even after the wound has healed, painful and very distressing sensations are often

* Now Major Worth, a distinguished officer at West Point.

felt, particularly during an easterly wind, and when the atmosphere is charged with electricity.

Many surgeons believe that very serious accidents and even death may result from the *wind* of a ball; but there is no foundation for such an opinion. The truth is, that a musket and even a cannon ball will now and then strike a part so obliquely, as not to enter or produce the slightest external wound, and yet the bones are crushed and the muscles dreadfully bruised. If it were possible for the *wind* of a ball to produce the mischief attributed to it, this ought always to follow whenever the ball passes very near the body. So far from this being the case, numerous examples are afforded of portions of clothes, hats, &c. being shot away, without the person wearing them sustaining any injury. There is, however, a real and oftentimes very serious injury, which some have supposed imaginary, resulting from a gun-shot wound,—a perturbation and extraordinary constitutional agitation, which the bravest men cannot resist. This is not an invariable symptom; for some patients are desperately wounded and do not exhibit any alarm whatever; while others are immediately seized with trembling, vomiting, and indescribable anxiety, even from the slightest scratch. Where such constitutional disorder, however, continues any length of time, it is to be considered generally very fair evidence of the severity and danger of the wound.

Treatment of Gun-shot Wounds.

It is very important, in all gun-shot wounds to suppress hemorrhage and extract the foreign body as soon as possible. If an artery be torn across, and continues to pour out blood copiously, we shall have good reason to conclude that its size is considerable, (for the smaller vessels seldom shed more than a few drops,) and the sooner we attempt to secure it the better. In many instances the part must be laid open freely, until we reach the mouth of the vessel, and secure it by ligature. Frequently, however, the vessel from its depth or situation, cannot be tied; in such a case, a compress thrust to the bottom of the wound and supported by a roller, may perhaps succeed. But the surgeon must not, in every case, think of dilatation, even although the hemorrhage be profuse; otherwise he will incur great risk of wounding important organs, or of opening arteries larger than those divided by the ball.

As soon as the flow of blood has diminished or ceased, the wound should be carefully examined, either by the finger or by some other instrument. If the finger be too large, or not sufficiently long to reach the bottom of the wound, recourse must be had to the *long gun-shot probe*, or to a wax bougie, or flexible gum catheter, or to the *urethra sound* of Bell; all of which are very superior to the small probe contained in the common pocket case. Previous to the introduction of an instrument, the wounded part should be placed, as nearly as possible, in the situation it was in at the time the wound was received. Without this precaution, the surgeon will often experience great

difficulty in reaching the spot where the foreign body is lodged, and will give the patient unnecessary pain. There are very few cases in which an examination cannot be made immediately after the receipt of the wound; for if the patient be overcome by the shock or nervous agitation, which is so commonly felt, this may speedily be removed in most instances by a little wine or spirits, or by a glass of cool water. Severe pain should never be an obstacle to examination, which should always be conducted with gentleness and care. If the wound be not examined immediately after its receipt, the lips soon close, and the whole tract becomes so much swelled and so painful, that it is almost impossible afterwards to ascertain the course the ball has taken, or the spot at which it is lodged. On the contrary, when the probe is carried along the passage recently made, it glides with facility, and at the bottom frequently encounters the ball or some other foreign matter, which must either be drawn out immediately by the forceps, or through a counter opening made directly over it. Provided the exact position of the ball be accurately marked at the time of examination, there will be no necessity, in all cases, for removing it at once; it may be left, sometimes, until the wound is healed. Mr. Hunter disapproves of making a counter opening at all, except the skin covering the ball should be deadened by the contusion and likely to slough. The experience of modern surgeons, however, proves that a counter opening may, generally, be resorted to with safety and advantage, unless the ball should lodge more than one or two inches from the surface.

Forceps of various shapes have been contrived for the removal of balls. In general, they are too clumsy, and so

large as to fill up nearly the whole passage—leaving very little room for the expansion of the blades. The forceps of *Chevalier* and those of *Percy* have this fault, in common with the rest, but are superior to any of the regular instruments of the kind. Very narrow forceps, longer and more slender than those contained in the common pocket case, with small and very sharp teeth, I have used for several years past, and have found them much superior to any others I have tried, particularly in those cases where the ball has not been lodged beyond three or four inches in depth; and where it has been deeper seated, advantage has seldom been gained from attempts to remove it by other means. A ball may sometimes be extracted very readily by the *scoop*, or by a single blade of *Percy's* forceps. The scoop of *Thomassin** is said to be the best instrument of the kind ever invented.

* “M. Thomassin has constructed a scoop which is more easy of application, and more effectual than the ordinary instrument. It is one of the best instruments which could be devised for the extraction of balls. It is formed of two branches, which slide upon each other by means of a groove. That, which properly speaking, is the body of the instrument, is eight inches long; at one of its ends is a kind of spoon, which is deep enough, and sufficiently curved to contain and hold the ball: the other end has two rings, one on each side, to receive the fingers; it is hollowed at its anterior and concave part, the other branch is exactly of the same length of the first, with the exception of the ring at its extremity; it is fitted to the groove of the other: its point is cut into an edge, so as to correspond to the edge of the scoop, which is received into a groove near its edge. This groove prevents the branch from going farther from the scoop. The *biseau* is intended to enter into a ball, so as to retain it in a spoon. A screw passes through this branch, a little below the rings, the ends of which pressing against the branch of the *biseau*, serve to fix it when necessary. This branch is graduated on the convex part of the other ring, so that

It has been proposed, for the removal of a bullet lodged in a bone to employ the trephine, or else an instrument formed at its end like a gimlet. The former can seldom be necessary, and the latter could not be used in most cases without giving the patient great pain. *See Plates II. and III.*

After the ball has been extracted, or searched for in vain, our attention must be turned to the dressings best adapted to the wound. Some surgeons, particularly Kern, Assalini, Percy and Guthrie, highly extol the use of cold water, or even ice water, when it can be procured, and direct that the part be constantly wet by pledgets. Since the late war my opportunities of treating gun-shot wounds have been comparatively limited, and at that period I was not aware of the reputation of the remedy, although it would seem that its efficacy was well known to the older surgeons, as Blondus published an essay on its virtues as early as the

the operator is able to judge of the size of the ball when it is in the spoon of the instrument. The two branches being united, are introduced to the bottom of the wound, and held like a pen. When the ball is touched by the end of the scoop, it is clenched, and the *biseau* is raised about an inch. The *biseau* is fixed at this height by half a turn of the screw. The scoop is then opened to receive the ball, and is easily passed along its side. When the ball is felt in the scoop, the instrument is to be used so as to dislodge the ball from the parts around it; half a turn of the screw then sets the *biseau* at liberty, and it is to be pushed upon the ball, by placing the thumb of the left hand in the ring, while the middle and index finger act upon the scoop. We may pass its point into the ball, by a strong pressure, or a turn of the screw. We are now sure of our object; however, we must not draw out the ball with violence, but on the contrary, extract it very carefully. We consider this the best instrument which has been devised for the extraction of balls."—*Boyer's Surgery, Vol. I. p. 187.*

year 1542. I am inclined to think, however, that after the first few hours, during which the tension, heat and pain are considerable, that the remedy will be found, if not injurious, at least less useful than an emollient poultice. At any rate, I have derived very great benefit from such applications from the very commencement of the wound, and have seldom seen injury result from their use, even when unnecessarily continued. The poultice should be applied until the swelling subsides and a free discharge of matter takes place from the wound, which may then be dressed with some mild ointment. Adhesive straps and rollers should be avoided in the commencement of all gun-shot wounds, but will often prove useful during the suppurative stage.

The older surgeons were fond of cramming the orifices of the wound with lint, of making ample dilatations, and of conveying setons throughout the whole tract made by the ball. These practices are now nearly exploded, and in their place the mildest and most simple means substituted. The symptomatic fever which commonly follows severe gun-shot injuries, must be combatted by blood-letting, purging and low diet. After the fever subsides and the wound suppurates abundantly, it may become necessary to support the patient, by a generous diet, and by the use of bark and the mineral acids. Oftentimes the wound remains fistulous and will not heal, owing to the presence of some extraneous matter, which should always be searched for. The severe wound of the shoulder received by General Scott, at the battle of Bridgewater, continued fistulous for many months; but closed permanently in a few days, upon my extracting from it a small piece of cloth. Where mat-

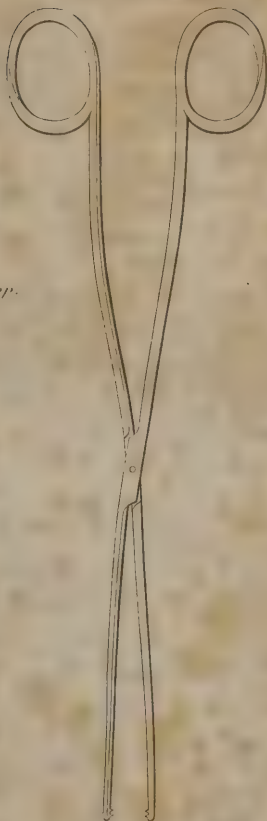
Ball's Gun-shot Probe.



Chevalier's Forceps.



Gun-shot Forceps.



Scoop.



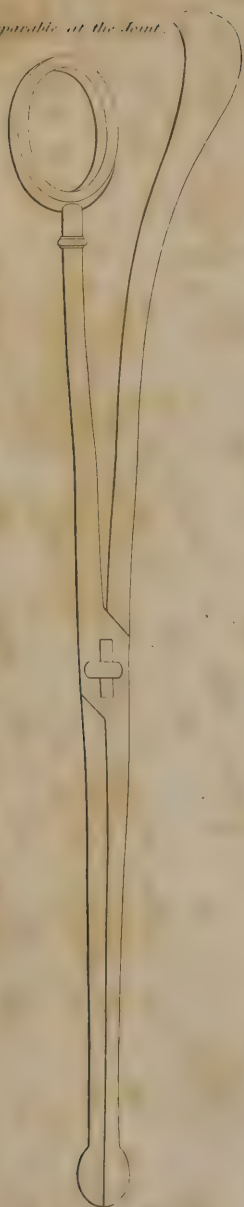
Long Gun-shot Probe.



Percy's bullet Forceps.

Pl. 3.

Blades separable at the Joint.



12 inches long to be used as it is.

Screw 5 1/2 inches long.



ter burrows under fasciæ and travels among muscles and tendons, ample incisions and free counter openings only will put a stop to its progress.

The propriety or impropriety of moving a limb injured by a gun-shot, will be considered under the head of *Amputation*.

See *Hunter on Inflammation and Gun-shot Wounds*—*Chevalier on Gun-shot Wounds*—*Larrey's Memoirs*—*Guthrie on Gun-shot Wounds of the Extremities*—*Thomson's Report of Observations made in the Military Hospitals in Belgium, 1816*—*Hennen's Principles of Military Surgery, 2d edition*; the most valuable work perhaps ever published on the subject—*Charles Bell's Dissertation on Gun-shot wounds*—*Mann's Medical Sketches of the Campaigns of 1812, 1813, 1814*—*C. Bell's Surgical Observations, p. 319, & seq.*

SECTION VIII.

Wounds of the Head and Face.

THE scalp being very vascular and abundantly supplied with nerves, is apt to suffer severely from wounds and contusions. An instrument pushed between the integument and bone, and creating a punctured or penetrating wound, will often give rise to an erysipelatous inflammation, which extends over the whole head and face, producing great pain and distress. At other times a slight blow on the head will cause an effusion of blood between the scalp and bone. This blood may remain stationary for months, forming a considerable tumour, and at last by pressure render the bone carious. Sometimes it has been mistaken by the surgeon for fracture of the skull. Such tumours are now and then met with on the heads of new-born infants, and are owing to pressure during the passage of the child through the pelvis.

Extraordinary nervous symptoms, such as great pain, spasmodic twitchings of the muscles of the face, paralysis of the limbs and even convulsions, resembling epilepsy, occasionally arise from contused wounds of the scalp; and what is remarkable, these symptoms do not appear, in many instances, until months or years after the injury. *Pouteau* was among the first to notice these singular affections, and to point out the proper remedy.

Incised and *lacerated* wounds of the scalp are by no means uncommon. The first generally proceed from sabre cuts in battle, and often it happens, under these circumstances, that considerable portions of the bone, and even of the brain and its membranes are sliced off with the scalp, without producing the patient's death. Several such cases are related by military surgeons, and many years ago I myself attended a patient,* whose left parietal bone had been forcibly struck by a hand-saw, the teeth of which penetrated the bone, dura mater and brain, and produced a fissure in the bone three inches long, without giving rise to a single bad symptom. It has been remarked by Dr. Hennen, that sabre cuts on the top of the head are not by any means so dangerous as those on its side. *Lacerated* wounds of the scalp generally proceed from rough bodies forcibly driven against the head, or from the passage of cart or carriage wheels over it, while the patient lies on the ground. These wounds, from being covered with dirt and blood, frequently present a very frightful appearance; but in truth are not so dangerous as some other injuries, provided they are properly treated.

Gun-shot wounds are more formidable than any other wounds of the head, and few patients recover from them, where the skull has been fractured and the brain injured. It is true there are examples to the contrary—where the skull has been extensively shattered, the ball lodged in the substance of the brain and afterwards successfully extracted. One instance, indeed, is recorded by Hennen, of a French soldier, wounded at the battle of Waterloo, by a bullet which passed through the squamous portion of the temporal bone and lodged in the substance of the brain.

* A servant of Richard Caton, Esq. of Maryland.

The wound was freely dilated, and the ball found imbedded in the posterior lobe of the right hemisphere of the brain, where it rests on the tentorium. It was extracted, along with some portions of brain that adhered to it, and the patient in a short time recovered. The same writer states, that he has known five cases, where a ball has lodged in the substance of the cerebrum, without immediately producing a fatal event. These are all to be looked upon, however, as anomalies,—curious rather than useful.

A bullet does not always enter the brain, even although it should fracture the skull. Sometimes both tables are fractured and depressed, and the ball rests immediately under the scalp. Sometimes it passes between the scalp and bone, many inches beyond the spot at which it entered, and without injuring the bone in the slightest degree. Sometimes the ball is divided into two pieces, each of which takes a separate route, and frequently the ball is so flattened or changed in shape, by impinging against the bone, that it is hardly possible to recognise it. In all cases where the ball has travelled any distance under the scalp, its course may be known in a few hours, by the red stripe or inflamed line, which traverses the surface of the skin covering it. The same may be observed in all other parts of the body. Frequently a bullet fractures the superciliary arch and lodges in the frontal sinus. In other instances it is buried beneath the aponeurosis or belly of the temporal muscle, and great tension, swelling and distress are the result. In short, it is hardly possible to calculate the course a ball may take when it strikes the head, or the effect it will produce; for the most trivial injury frequently terminates in death, contrary to our expectation, and, on the

other hand, injuries apparently the most desperate, sometimes result in the happiest manner.

Bertrandi,* an eminent French surgeon, was among the first to notice the fact, that abscesses of the *liver* frequently follow wounds and other injuries of the head. His observations were soon after confirmed by Andouillé,† and the experience of modern surgeons has demonstrated the frequency of the occurrence. The same connexion, according to Klein, exists, and to a greater degree between the liver and shoulder joint. Many theories have been framed in explanation of these circumstances, but none of them appear satisfactory.

According to Hennen, Larrey, and others, wounds on the back of the head, are sometimes followed by atrophy of the genital organs and loss of the procreative powers.

Wounds of the face may involve the eye, nose, lips, salivary ducts, &c. The *eye* may be burst by a blow, or the humours evacuated by an incised or punctured wound, or one or both eyes may be torn out by the passage of a ball. It happens now and then that a ball passes into the orbit and lodges between it and the bone, without destroying the patient's sight. Sometimes the destruction of one eye will cause a paralysis of the other. Wounds of the supra-orbital nerve almost invariably give rise to amaurosis, and there is probably no instance on record, in which the patient has

* De hepatis abscessibus qui vulneribus capitis superveniunt. In Mémoires de l'Académie Royale de Chirurgie, tom. ix. p. 130—edit. octavo.

† Idem, p. 168.

perfectly recovered his sight after such a wound. Painful and very troublesome fungi often sprout from a wounded eye, and sometimes the whole globe becomes enormously enlarged, and protrudes from the socket. *Diplopia* or double vision, may follow an injury of the eye, or of the parts in its immediate vicinity.

Wounds which open the cheek, and divide the *parotid* duct, frequently give rise to a very troublesome disease—*salivary fistula*. This fistula forms almost immediately, if the wound is not treated in a proper manner, and indeed, it is sometimes impossible to prevent it, even under the best management. From the fistulous orifice there is a constant and copious discharge of saliva, especially during mastication. This passing over the cheek, excoriates it, and together with the fungus, which almost always sprouts from the opening, renders the patient's situation very uncomfortable.

The *ear* is sometimes completely severed from the head by a sword or ball. It might be supposed, in this case, that the sense of hearing would be diminished or destroyed; but this is not found to happen.

The *nose* and *lips* may be wounded in a similar manner, and instances are recorded of the greater part of the face, including bones as well as soft parts, being divided by a sabre in the most shocking way; and yet the patients have recovered, without much deformity.

The *tongue* being protected by the mouth is seldom injured, except by a bullet or by the teeth. In battle it fre-

quently happens that a ball enters the mouth, carrying before it a number of the teeth; these are forcibly driven into the tongue, palate or adjoining parts, and produce a lacerated and dangerous wound. At other times the ball enters one side of the lower jaw, fractures it, and passing through the tongue emerges at the opposite side of the face. I met with several cases of the kind after the battle of North Point, and found them extremely difficult to manage. The tongue when thus wounded, is very apt to become paralysed and crooked, and secondary hemorrhage after such accidents is by no means uncommon. During epileptic fits, and other convulsions, the tongue is sometimes almost separated by the teeth; indeed, in some instances it has been completely bitten off.

Treatment of Wounds of the Head and Face.

The first step to be taken in all wounds of the head, is to shave the part accurately. From inattention to this preliminary measure, important injuries have escaped observation, and caused the patient's death. The surgeon should, therefore, not be satisfied with the removal of a few locks, from the immediate vicinity of the wound, but should shave to the distance of several inches, and, if necessary, clear the whole head of every particle of hair. This being done, the most careful examination must be made, in order to ascertain whether the bone is injured, or whether the scalp alone has suffered. In the former case, it may become necessary to use the trephine, provided the symptoms justify it—in the latter, local applications, calculated to

prevent or subdue inflammation, such as cold water or ice water, leeches and blisters. When the wound is incised or lacerated, and the scalp separated from the bone and turned down, it should be washed, if covered with dirt or blood, carefully replaced, and stitched with the interrupted suture, unless adhesive straps and bandages are sufficient to keep it in its natural situation. The older surgeons invariably cut away the injured scalp, by which the bone was left bare and made to exfoliate. The moderns always attempt reunion, even if the scalp be ever so much torn, and for a very good reason—the part cannot be rendered worse by the attempt, and may be completely restored.

Bloody tumours of the scalp resulting from contused wounds, should never be opened, unless they become very large, remain for a long time, or proceed from the wound of some large vessel which pours out blood copiously, and requires the ligature. Ordinarily these tumours are absorbed in a few days.

When the scalp remains tender and painful for months or years, and spasms are excited by pressure on the affected part, the most certain way of removing the complaint is to make a free and decided incision to the bone. *Pouteau* practised this operation with great success; and the celebrated case of *Magdalen Mondet*, recorded in his "*Mélanges de Chirurgie*," proves the efficacy of the remedy. Dr. Physick has for many years pursued the same plan, though not always with the desired effect. Where the incision has failed, however, he has sometimes succeeded by repeated doses of emetics; indeed, emetics alone will occasionally effect a cure; in other instances they prove of

no service, and the disease remains incurable. In two or three cases I have prescribed the extract of stramonium with great relief.

For the removal of the *erysipelatous affection* which so commonly follows a punctured or penetrating wound of the scalp, there is nothing so useful as nauseating antimonials, the blue pill, mild purging, and abstinence. For this practice we are chiefly indebted to Desault.

Gun-shot wounds of the head must be treated upon the principles formerly pointed out; but especial care should be taken not to search too diligently for a ball that has passed through both tables of the skull, lest more injury result to the brain and its membranes, from the officiousness of the surgeon, than from the presence of the extraneous body.

With the exception of salivary fistula, the treatment of wounds of the face is commonly very simple. When the nose, lips, eyelids, and ears, are incised or lacerated, we bring the edges together by a few tacks of the interrupted or twisted sutures, and support them by adhesive or court-plasters and by bandages, taking care to secure, *in the first place*, the angles or hanging portions of the flesh; in order to obviate the deformity, which otherwise is apt to follow, from one edge overlapping the other. The common roller has superseded all the particular bandages formerly contrived for the head.

There are three modes of treating a wounded or fistulous parotid duct—by *compression, seton, and caustic*. The first is generally employed immediately after the duct

is wounded, and with a view to procure direct reunion. Owing to the difficulty, however, of approximating the two ends of the duct, and of holding them in exact contact, permanent benefit seldom follows any attempt of the kind. On this account, the wound, in almost every instance, becomes fistulous and requires a regular operation, or the caustic. Monro, the father, was very partial to the seton, and Desault, with particular modifications, preferred it to any other mode. His plan was to introduce two fingers into the patient's mouth, opposite the fistula, to keep the cheek tense, while from behind, he passed forward a small trocar and cannula through the cheek, immediately before the posterior end of the duct. The trocar was then withdrawn, leaving the cannula, through which a thread was conveyed into the mouth. This thread was attached to a seton, the cannula removed, and the seton carried from within outwards, but not sufficiently far to fill up the external orifice, in which the thread alone rested. The wound was dressed daily for six weeks with lint, the patient kept on a low diet, and the jaw as still as possible. The seton and thread were then withdrawn, and the external orifice touched with lunar caustic until it healed. Simple as this operation may appear, it will be found by no means free from difficulty, and although successful in the hands of the dexterous Desault, can hardly fail to embarrass the inexperienced surgeon. I have strong doubts, however, of the propriety of resorting to the operation, under any circumstances, without the previous trial of other remedies, especially the caustic, which has proved successful in almost all the cases in which I have used it.

When the *eye* has been so severely wounded as to be irrecoverably lost, the surgeon will save the patient much

pain and distress by an incision, sufficiently free to evacuate suddenly all the humours. The mildest dressing should then be employed, and if troublesome fungi afterwards sprout, repeated applications of the *argentum nitratum* will be found sufficient to repress them. The antiphlogistic system, to the fullest extent, is commonly demanded in such cases.

It is often extremely difficult to manage a wounded *tongue*, especially as the accident most frequently occurs amongst maniacs, or persons subject to convulsions. The best plan, in all cases, is to pass the interrupted suture through the substance of the tongue, and connect the wounded edges to each other—afterwards taking care to prevent the teeth from irritating the parts, by interposing some contrivance calculated to keep them asunder. The machine of *Pibrac*, described in the 9th volume of the “*Memoirs of the Academy of Surgery of Paris*,” and which consists of a piece of wire, having attached to it a bag, sufficient to contain and support the tongue, is perhaps as well calculated to answer the purpose as any other.

When the *ear* is wounded, and nearly separated, it should be stitched, like any other dependent part, and afterwards firmly supported against the head, by compresses and bandages.

See *Desault's Works*, vol. 1—*Potts' Works*, by *Earle*, vol. 1—*Pou-teau's Posthumous Works*—*Hennen's Principles of Military Surgery*, p. 277—*Thomson's Report of Observations made in the Military Hospitals in Belgium*, p. 49 and 63—*Discourses on the Nature and Cure of Wounds*, by *J. Bell*; also his *Principles of Surgery*, vol. 2. part. 2.

SECTION IX.

Wounds of the Neck.

EXTENSIVE incised or deep penetrating wounds of the neck are very apt to prove fatal,—owing to the large and numerous blood vessels and important nerves with which it is supplied. If the carotid or vertebral arteries be cut across by a sharp instrument, or by a ball, the patient dies instantly. It is true a few cases have been recorded of recoveries after such accidents; but these are so extremely rare, and the circumstances attending them so peculiar, as not to affect the general position—that such accidents are mortal. The most common wounds of the neck are incised, and these are generally made by the attempts of suicides. These attempts, however, frequently fail, owing to an impression, which almost universally prevails—that wounds of the *windpipe* are necessarily fatal. Under this idea most suicides aim at the division of the larynx or trachea simply, and carry the cutting instrument as high upon the neck as possible. On this account the carotids, which retire deeply in proportion as they ascend the neck, escape—when, even a superficial wound, low in the neck, would open them. A patient may die, however, from hemorrhage, without the carotids being touched—from the division of the thyroid or lingual arteries. Frequently it happens, that these vessels are divided and bleed furiously, and the patient faints. The surgeon being called during this interval, draws out the arteries and secures them.

When the thyroid gland is wounded deeply, the hemorrhage is very copious and often fatal.

A mere division of the larynx or trachea is, comparatively, unattended with danger. Some surgeons have doubted the possibility of wounding the œsophagus, without dividing at the same time the large blood vessels and nerves; but several examples to the contrary are recorded. When the neck is wounded above the os hyoides, numerous muscles, the root of the tongue, the lingual artery, and perhaps the salivary ducts, the ninth pair of nerves and the pharynx, may be divided. An opinion has long been entertained, that a division of the eighth pair of nerves is necessarily fatal. Klein, a celebrated German surgeon, not only questions the statement, but denies positively that it is founded in fact. The experiments of Haighton, however, prove that the nerve on one side of the neck may be wounded without producing the death of the animal, but that the division of both nerves is inevitably fatal.

Treatment of Wounds of the Neck.

In many instances the patient dies of hemorrhage before the surgeon can reach him, having completely severed the carotids, thyroids or jugulars: at other times he is found weltering in blood and almost lifeless. The surgeon takes advantage of his reduced state, sponges away the clotted blood and seeks the divided vessels. These being secured by ligature, the edges of the wound are brought together by adhesive plasters or sutures. In extensive and deep

wounds sutures are indispensable; they should only pass, however, through the integuments and muscles, and not involve either the larynx or trachea, otherwise a troublesome cough and incessant irritation will be kept up. It has been too much the practice to use sutures upon all these occasions, whether the wound be extensive or not. In superficial wounds adhesive straps answer every purpose, and should be preferred to sutures, inasmuch as they obviate deformity and prevent considerable pain. Over the straps or sutures it will be sufficient to place a light pledget or bandage.

Maniacs, who have attempted suicide, should be confined by the strait waistcoat, to prevent them from tearing open the wound, to which they are exceedingly prone. In all cases the position of the patient's head is of great consequence as respects the healing of the wound. Writers usually recommend the head to be brought forward, and supported on the breast. The practice I am sure is objectionable, inasmuch as the parts overlap, and uniting irregularly and in an unnatural position, create deformity by leaving an ugly gap. To prevent such consequences I have, for many years, employed a common *leather stock*, similar to that worn by military men, which being slightly confined to the neck, has supported the chin and kept the head in a natural position. An oval hole cut in front of the stock has enabled me to dress the wound without disturbing the patient, or changing the position of the wounded parts. No bandage, however contrived, can retain the patient's head immoveably fixed. On this account, assistants should constantly sit by him and keep it steady with their hands.

The *elastic catheter*, although recommended both in wounds of the trachea and œsophagus, with a view to prevent motion of the larynx and to nourish the patient, will be found, I conceive, seldom necessary, and in some cases cannot be employed without exciting great irritation. When the neck is laid open above the os hyoides, so as to leave the pharynx gaping, and fluids run out of the wound as soon as they are introduced into the mouth, then the catheter becomes extremely useful, and indeed indispensable; but to introduce it upon every common occasion, whether the pharynx or œsophagus be touched or not, merely for the purpose of preventing the motion of the windpipe, is manifestly improper, inasmuch as it cannot remain in the œsophagus for any length of time, while the surrounding parts are highly inflamed, without great inconvenience to the patient; and to introduce it every time he requires drink, and generally the thirst is incessant, would be productive of more irritation than any efforts to swallow in the natural way could possibly occasion.

See *J. Bell's Discourses*—*C. Bell's Operative Surgery*, vol. 2. p. 22—*Allan's Surgery*, vol. 1. p. 425—*Thomson's Report*, p. 71.

SECTION X.

Wounds of the Chest.

ANY one acquainted with the structure of the organs contained within the chest, would naturally conclude that it was hardly possible for a sword or bullet to pass through the lungs or large vessels, without inflicting a mortal wound. Recoveries, however, are so common after severe and apparently desperate wounds of this description, that few surgeons of the present day look for an unfavourable result, even in the worst of cases. This calculation would seem well grounded, when we recollect the statement of Dr. Gregory—"that of twenty-six wounds of the thorax received at the battle near Quebec, two only were fatal."* On the other hand, it should not be concealed that many patients die instantaneously from wounds of the chest, or linger months or years in the greatest distress, and finally sink from profuse discharges of matter and hectic fever. Dr. Hennen calculates strongly upon recovery in almost every case, provided the patient survive beyond the first 48 hours. "I have seen so many wounds of the thorax," says he, "both from pike and sabre thrusts, and from gunshot do well ultimately, that I cannot but hold out great hopes where the third day has been safely got over."†

* Hennen's Principles of Military Surgery, p. 387.

† Ibid.

The great danger of all wounds within the cavity of the chest consists in the hemorrhage. This may proceed from a wound of the lungs, or of the intercostal artery, or from both at the same time. When the *lungs* are wounded, the patient is instantly seized with difficult respiration, accompanied by great anxiety, and a flow of blood from the mouth, which, as it is poured out from the wound, enters the air cells of the lungs and occasions a distressing sense of suffocation. These symptoms are sufficient to assure the surgeon of the nature of the case: it is possible for the lungs to be wounded, however, without the patient's coughing up blood, especially if the wound is so situated as to permit the blood to escape into the cavity of the chest, as often happens. A wound of the *intercostal* artery may proceed from a shattered rib or from the instrument inflicting the wound; in either case the blood may flow into the chest, or out of the external wound. Hemorrhage from this source is neither so profuse nor so dangerous as has commonly been imagined.

Another consequence of wounds of the chest, although not a frequent or dangerous one, is *emphysema* or a collection of air in the cellular membrane adjacent to the wound, and spreading thence in some instances throughout the whole cellular tissue of the body, creating an immense windy tumour, inconvenient to the patient from pressure rather than pain. This collection of air may arise from a wounded lung, or from a simple opening in the cavity of the chest; in either case the air is forced into the cellular membrane, in consequence of the wound being partially closed by coagulated blood, by a change in the position of the muscles and other parts adjacent to the wound, or by

extraneous substances blocking up the tract made by the instrument inflicting the wound. Emphysema from a wounded lung may become very general and extensive, while that from a simple opening into the chest must necessarily be very limited.

An opinion commonly prevails that a wounded lung will *always* collapse. This is by no means the case; for although it really happens in most instances, and is the great safeguard of the patient, by allowing the wound fair opportunity to heal during the quiescent state of the lung, while retired to the bottom of the chest and ceasing to perform its function, yet many examples are recorded of an opposite state—a protrusion of more or less of the lung from the external wound, which has occasionally given rise to very troublesome and even fatal consequences.

Supposing the patient to have escaped the immediate dangers of his wound—hemorrhage, emphysema, &c. he may yet be doomed to suffer immensely, and perhaps die, from the effects of inflammation. *Suppuration* is soon established within the cavity of the chest, which is denoted by rigors, a flushed cheek, difficulty of breathing, pain and swelling in the injured side, and not unfrequently by a sense of fluctuation. Sometimes matter is coughed up from the lungs, but generally it accumulates in the chest until the quantity is so large and its presence so intolerable, that the patient is suffocated unless relieved by the operation of *empyema*. At other times the wound becomes fistulous, and quantities of matter are constantly discharging from the opening, or are drawn off at stated periods. The extraneous bodies, such as broken and exfoliating ribs,

pieces of cloth or bullets, often contribute in no small degree to its secretion, by falling into the chest and lodging on the diaphragm, where they keep up perpetual irritation. Many patients survive for years under these circumstances, while others perish in a few weeks from debility, or confirmed phthisis pulmonalis. Upon dissection, the injured lung is generally found contracted and indurated, its cells consolidated, and the whole volume so diminished as to occupy a very inconsiderable portion of the chest—leaving it, in fact, almost empty.

Many wonderful cases have been recorded by the older surgeons and by modern writers, of wounds of the *heart* and *large vessels* in its neighbourhood, without being followed by instant death—the patients surviving for days or weeks. Parè, Bonetus, and Morgagni give detailed accounts of such accidents, and within a few years Babington, Chastenet, Featherton, and Fuge, have furnished very interesting particulars of similar cases.

Superficial wounds of the chest are seldom productive of much injury, inasmuch as there is little danger of hemorrhage—the vessels being small and few in number. An exception to this occurs, however, in the case of a wounded *infra* or *supra scapular* artery. The former vessel in particular is liable to be cut across, and pours out blood so insidiously, that the surgeon is scarcely aware of the hemorrhage, until the patient is nearly exhausted. After death the whole cellular tissue, and even the interstices of the muscles from the shoulder to the loins, is found loaded with blood. I have met with two cases of this description, both of which proved fatal in a few hours. A ball striking the

chest obliquely, is very apt to take an angular, or circuitous route—by following the course of a rib: in some instances it has run entirely around the chest, and emerged near the spot at which it entered. Many owe their lives to this accidental deviation of a bullet.

Treatment of Wounds of the Chest.

The moment the surgeon casts his eye upon a person wounded in the chest by a sword, lance or bullet, and sees the blood streaming from the wound or issuing from the mouth, he may calculate immediately upon the nature of the case, and should lose no time in affording relief. He must draw blood copiously from the arm, which will have the effect of diverting it from the lungs, and thereby save the patient perhaps from suffocation. From thirty to forty ounces may be drawn with perfect safety. The blood-letting must be repeated according to the urgency of the case, and indeed can hardly be carried too far; for if the patient be not relieved by this measure, no other can possibly save him.

After the hemorrhage from the mouth and wound has diminished or ceased, the attention of the surgeon should be directed towards the *removal of extraneous bodies and dressing* of the wound. As little probing as possible is desirable. If there be loose and shattered ribs, these must be picked away carefully, or if not easily gotten at the wound may be moderately enlarged. It is very seldom that a bullet which has entered the chest can be found—at least

until the establishment of the suppurative inflammation. The best practice, I conceive, is in every instance to close the wound as soon as possible after the removal of foreign matters, even although a considerable quantity of blood be deposited in the chest. Adhesive straps should first be applied, and over these lint and a light compress secured by a roller carried over the greater part of the chest, with sufficient tightness to oblige the patient to breathe by the diaphragm and abdominal muscles. During the cure, frequent repetition of the blood-letting may become necessary; and together with this purgatives, digitalis, low diet, and occasional doses of opium, to relieve the cough will be found extremely useful.

Emphysema is a very rare occurrence after wounds of the chest, and may always be prevented, there is reason to believe, by an accurate closure of the wound. When it does occur, a few decided incisions or punctures, as near the seat of injury as possible, followed up by bandaging, will speedily effect a cure.

The so much dreaded hemorrhage from a *wounded intercostal artery*, may generally be stopped by a compress judiciously applied. Gerard proposed to secure the vessel by a ligature, to which was attached a dossil of lint, passed around the rib by a curved needle. This plan was tried successfully by Plenck, but a similar operation in the hands of Theden, caused the patient's death. Hennen, a most experienced military surgeon, never found it necessary to employ even the tenaculum.

When a wounded lung *protrudes* beyond the walls of

the chest, it should be carefully returned by the fingers; when it forms adhesions with the surrounding parts, as sometimes happens, and becomes strangulated, it should be left to slough away. The ligature, recommended and practised by some surgeons, ought never to be used.

The treatment of the secondary or *suppurative* stage of a wound of the chest will often prove as tedious and difficult as that of the primary symptoms. As soon as it is ascertained that matter has collected within the chest, in such quantity as to create urgent symptoms or endanger the patient's life, the operation of *empyema* must be performed for its removal,—provided the wound in the chest has entirely closed. Between the sixth and seventh rib is the proper place to make the opening, which should not extend beyond an inch and a half. The muscles being cut through, the pleura is exposed and opened cautiously with a bistoury or lancet. Many patients are immensely relieved upon the discharge of the matter, but others become suddenly debilitated and very soon die. If a fistulous orifice remain, an opening into the chest may not become necessary, unless as a counter opening,—which may serve to drain off the pus more completely than could be done through the fistulous orifice, owing perhaps to its high situation. To empty the chest completely through the fistula, the surgeon will find it most convenient to lay the patient on his side, so as to make the position and outlet as dependent as possible. In four or five cases I have succeeded in floating out with the matter, pieces of cloth and bits of exfoliated bone, by throwing in an injection of tepid milk and water. These substances kept up considerable irritation and promoted the secretion of matter, which soon after their removal nearly

ceased. During the whole course of the suppurative stage the patient should enjoy a good diet and fresh air. Tents, if possible, ought to be dispensed with, as they prevent the wound from healing, and if worn long and habitually cannot be removed without detriment to the patient's health.

See *J. Bell's Discourses*—*Hennen's Military Surgery*, p. 367—*Larrey's Memoirs*—*Halliday on Emphysema*.

On the subject of *Empyema*, consult *Hey's Practical Observations in Surgery*, p. 494, edit. 3d. 1814—*Sharp's Critical Enquiry*, p. 231.

SECTION XI.

Wounds of the Abdomen.

WOUNDS of the abdominal viscera have generally been considered not less perilous than those of the chest and some other parts. The danger must obviously depend, however, upon the particular organs wounded, and upon the extent and kind of wound inflicted. The peritoneum, being endued with exquisite sensibility and extremely prone to inflammation, sometimes suffers immensely even from the most trivial accident, and is the chief source of mischief in all abdominal injuries. Inasmuch, therefore, as this membrane envelopes most of the viscera of the belly, and is more or less concerned with those of the pelvis, it can hardly escape any instrument which may pass beyond the muscular or tendinous parietes. Many cases have occurred, nevertheless, in which balls and swords have passed completely through the abdomen, transfixing the peritoneum and several convolutions of intestines, not only without producing the patient's death, but without giving rise to a single bad symptom. Such favourable terminations are readily explained, when we recollect the remarkable property possessed by all serous membranes of taking on speedily the adhesive process, which serves to prevent effusions and to obliterate in a wonderfully short time all traces of the wound. This adhesion is brought about by the universal pressure of the abdominal muscles and diaphragm upon the viscera of the abdomen, by which they

are kept in close contact with each other and a vacuity completely prevented, and by the serous effusion poured out almost immediately from the abdominal and intestinal peritoneum, which agglutinates the surrounding parts and closes the wound. The older surgeons were in constant dread of fecal effusions between the intestines and walls of the abdomen, and resorted to many useless and dangerous expedients to counteract the supposed tendency. The experiments of the celebrated Petit put to flight all idle fears on this point, and proved that effusion from penetrating wounds must necessarily be of rare occurrence. When effusion does take place, however, whether of bile, blood, or the contents of the stomach or intestines, as occasionally happens from extensive wounds or from violent blows, rupturing the intestines and giving rise to ulceration, the patient hardly ever recovers, but dies in a few days in great torture—from universal peritoneal inflammation.

Superficial wounds of the abdominal muscles or their integuments seldom prove of much consequence, and are to be treated upon common principles. To ascertain whether an intestine or some other internal viscus be wounded, is often by no means an easy matter. Frequently it happens, that a ball enters the abdomen and passes out at the opposite side, leaving two openings, having penetrated apparently all the intermediate viscera, when in reality its course has been diverted by the resistance of the tendinous or muscular walls of the belly, and it has ranged between these and the intestines—brushing their coats without opening their cavities. In this way many patients have escaped, when the surgeon has supposed the bowels extensively wounded. But a wound of this description is often not less

dangerous than one which penetrates the intestines at once; for in a few days a slough separates from the bruised viscera, and opens a direct communication between them and the external wound. The *most certain* sign of a wounded intestine is the discharge of blood from the anus, or of fæces, bile or food from the wound. The absence of such signs, however, is no proof that the viscera remain entire. In general we may calculate upon some large vessel being opened, or some important organ being injured, when we find the patient's countenance sunk and covered with a cold sweat, his extremities cold, his breathing difficult, and the nervous energy very much exhausted.

Wounds of the small intestines, especially the *duodenum*, are much more dangerous than those of the large, inasmuch as there will be greater difficulty of nourishing the patient, and more risk of effusion. An intestine sometimes protrudes a considerable distance beyond the external wound, although it has sustained no injury; in other cases it is extensively wounded, and along with the omentum projects beyond the parietes of the abdomen. Instances are recorded of the protrusion of the whole of the intestines except the duodenum.

Wounds of the *stomach* are extremely hazardous, and in nine cases out of ten mortal. Dr. Thomson saw but two patients recovering from such wounds, after the battle of Waterloo. Dr. Hennen never had an opportunity of treating a wounded stomach; and hence perhaps it may be concluded, that most patients die immediately upon the receipt of such injuries. Many wonderful examples are to be found, especially among the older writers, of perfect reco-

varies after wounds of the stomach, even under the most desperate exigencies.

Wounds of the substance of the *liver*, where large vessels are opened, are almost certainly fatal; but patients frequently recover after slight injuries of this viscus. A very interesting case, of most desperate wound of the liver, followed by perfect recovery, is related by Hennen.*

Wounds of the *kidney* generally prove fatal, immediately or remotely—either from effusion of blood or urine; but the *urinary bladder* is often pierced by balls and other instruments, without producing the patient's death. "We saw no fewer than fourteen cases," says Dr. Thomson, "recovering, in which the bladder had been penetrated by musket balls."† During the late war I had two patients who received bullet wounds in the bladder, between which and the rectum communications afterwards formed—causing an admixture of the urine and fæces. A musket ball lodged in the bladder has served as a nucleus for a stone, to get rid of which the patient has sometimes undergone the operation of lithotomy.

Wounds of the *genital organs* are not very common, but very distressing when they do occur. Sometimes the whole scrotum sloughs away and leaves the testicles bare; at other times, fungous excrescences sprout from the testicles themselves, and are very difficult to manage. In other instances, the testicles are irrecoverably destroyed, from the diseased action induced by the injury.

* Page 430.

† Report, p. 108.

Treatment of Wounds of the Abdomen.

The surgeon should make it a rule, when called to a wound of the abdomen, to spare the probe and finger as much as possible. Such examinations, too often thoughtlessly made, can do no good, and have been the cause of great mischief. When there is reason to believe that an extraneous body, a bullet or piece of glass, has merely passed through the muscular parietes, and lodged on the surface of the peritoneum, the finger should be introduced, and if felt, an attempt made with the forceps to extract it; but when the foreign body has entered deeply among the viscera, or has taken a circuitous course, it will be quite useless to attempt to follow it. Sometimes a bullet has been discharged by stool, after the surgeon has made repeated and vain efforts to reach it by his probe.

When a portion of intestine protrudes from the external wound, distended with flatus, and not reducible by mere pressure with the fingers, many of the older and some of the modern surgeons advise puncturing it with a needle or fine trocar. This practice I consider dangerous and unnecessary, inasmuch as a slight dilatation of the wound will relieve the stricture and restore the gut. Besides, experience has proved that a puncture does not always answer the purpose; for the opening is immediately closed by mucus, or as Mr. Travers contends, by the villous or mucous coat of the gut. Should the external wound be large, it may be found difficult to retain the protruded gut after it has been restored, unless a suture be employed. In this case it should be used; but the adhesive strap ought first to be tried. If

the omentum should adhere to the edges of the wound from being long protruded, it may with safety be cut off and the individual vessels tied.

To arrest internal hemorrhage and combat inflammation, venesection, low diet, and rest, in the supine posture, are the proper remedies. Purging is out of the question; but mild enemata may be used with advantage in particular cases.

As respects the management of a *wounded intestine*, much controversy has prevailed, and to a certain extent still exists. I believe it may be stated, however, that the most experienced surgeons concur in reprobating the interference of the surgeon in the generality of cases—under the impression that nature, unassisted, will do more for the patient than art can ever accomplish by the most ingenious contrivances. Cases, however, undoubtedly occur, though very rarely, in which it may become necessary to stitch a wounded bowel. For this purpose two operations only, as far as I am acquainted, are ever resorted to at the present day—those by the *interrupted* and *continued* sutures. The former is strenuously advised by Mr. John Bell, the latter by Mr. Travers. Although I have had frequent occasion to treat wounds of the intestines, I have never yet been under the necessity of employing a suture in a single case; having trusted always to the general means pointed out, and to simple dressings. Dr. Hennen declares, that “in the course of a very extensive practice, (and perhaps no military surgeon ever had more,) two cases only have come under his notice where stitching was required to a wounded intestine.” Should a case present itself which, from the extent of the wound and other circumstances, seemed

to require a suture, I should be inclined to follow the plan of Mr. Bell, and simply employ one or more tacks of the *interrupted* suture, merely for the purpose of connecting the wound in the gut slightly to the external wound. Sir Astley Cooper tied up an opening in a gut, by passing a ligature around it in the manner we encircle the mouth of a bag, and cut off the ends of the ligature close to the knot; the patient recovered without a bad symptom. Many years ago I performed a similar operation in a case of hernia, and with equal success. From experiments made by Dr. Thomson and others upon inferior animals, it has been ascertained that the ligature, when thus placed upon a wound of the intestine, finds its way through the coats of the gut and is discharged by stool. Although sutures are so seldom necessary for the wounded intestine itself, they are often extremely serviceable, and indeed indispensable, for holding together the edges of an extensive external wound—for, without such support, it would frequently be impossible to prevent the whole contents of the abdomen from escaping. They should always in these cases be well supported by adhesive straps.

It has been proposed in the event of blood *largely effused* within the abdomen, to make an opening and evacuate it; and instances are recorded where the operation has been successfully practised. The experience of the best modern surgeons is against the operation, upon the ground that peritoneal inflammation of a fatal character always precedes the symptoms that would seem to justify the measure.

An *artificial anus* not unfrequently follows a gun-shot wound of the intestines. In all the examples of this de-

scription I have seen, spontaneous cures have taken place, after the contents of the bowels have been discharged for several weeks through the fistulous opening—which has healed up very soon after the fæces have resumed their natural route. The treatment of the complaint, when it proves obstinate, will be considered under the head of *Hernia*.

The treatment of *wounds of the stomach* must be very decisive. We draw blood copiously from the system and keep the patient as low as possible, both to subdue inflammation and to prevent any food introduced by the mouth from finding its way into the cavity of the abdomen, where it would be liable to excite great irritation. Stitching will in most cases, be unnecessary, and indeed perilous. When resorted to, however, the interrupted suture should be passed in such a way as to connect the edges of the stomach with those of the surrounding muscles and integuments—instead of sewing up the stomach alone. The patient must be nourished for some time by glysters, and this will be found the most difficult part of the treatment.*

* “ Mr. Travers, in the Edin. Journ. of the Med. Sciences, for Jan. 1826, relates, that a female, aged 53, and the mother of *nineteen* children, inflicted on herself a wound in the abdomen, three inches in length, and in a transverse direction. When admitted into St. Thomas' Hospital, at the expiration of six hours, the greater part of the large curvature of the stomach, the arch of the colon, and the entire large omentum, were protruded and strangulated in the wound. The omentum was partially detached from the stomach, which organ was wounded in two places; one, half an inch long through the peritoneal coat; the other a perforation of all the coats, admitting the head of a large probe, and giving issue to a considerable quantity of mucus. Patient faint; pain slight; pulse 102, and irregular; some hiccup. A silk ligature was

For wounds of the *liver, spleen, pancreas, and kidney*, but one plan can be pursued—the lancet and whole anti-phlogistic system. When the *urinary bladder* is injured in such a way as to give rise to urinal infiltration, the elastic catheter will prove immensely serviceable, and indeed is our only resource independently of the depleting plan, which must not be neglected. Escharotics will rarely prove powerful enough to subdue the fungus which sprouts from a *wounded testicle*. Nothing less than the knife will answer, by which all the diseased parts must be sliced away, in order to make room for sound granulations and the healing process.

placed round the small puncture in the stomach, and the displaced viscera returned, after enlarging the external wound. This last was closed by the quill suture. Warm fomentations and abstinence from food and drink enjoined. 2nd day, some re-action; had been sick in the night from some drink given; is free from pain; pulse 120; pain on pressure: an enema ordered. *Evening*, a dose of castor oil, and twenty leeches to the abdomen. 3d, much fever; V. S. ℥xviiij. and 20 leeches to the abdomen; bowels not opened. 4th day, two stools; pulse 98; tension of the abdomen; three more stools during the day. 5th, sutures removed; wound united, except at its right extremity, where a serous fluid is discharged in considerable quantities. On the 6th day, was allowed food, and on the 23d of Dec. about two months after the accident, was discharged cured.”—*North Amer. Med. and Surg. Journ.* No. III. p. 199.

See *Hunter on Inflammation and Gun-shot Wounds*—*J. Bell's Discourses*—*Travers' Inquiry into the Process of Nature in repairing Injuries of the Intestines*—*Hennen's Military Surgery*, p. 401—*Allen's Surgery*, vol. 1. p. 444—*Scarpa on Hernia, Memoir 4th*, p. 288—*Smith's Inaugural Essay on Wounds of the Intestines*, published at Philadelphia in 1805.

SECTION XII.

Wounds of the Joints.

I MIGHT next treat of wounds of the *extremities*; but these when simple, or not complicated with fracture, are to be treated upon principles already laid down, and do not therefore require a separate consideration. Gun-shot and other extensive injuries, involving shattered bones, will be discussed under the heads of *Fractures* and *Amputation*. In this place a few peculiarities attending the condition and treatment of wounded joints may be pointed out.

Wounds of the larger joints are among the *most dangerous* accidents in surgery; and although numerous cases are met with in writers, of perfect recoveries after such injuries, these do not affect the general position, but must be referred to peculiarities of constitution and to causes not easily explained. The same may be said of those wounds of the smaller articulations, trivial in the eyes of the surgeon, but in defiance of all calculation sometimes followed by tremendous symptoms and even death. So far then as cases go, both sides of the question, as respects the harmless or perilous nature of wounded joints, might be equally well supported; and in proof of this I may mention, that I have known a bullet pass directly through the knee joint of a dragoon, between the heads of the bones and among the ligaments, without being followed by any serious symptoms—in another case, the knee joint torn open and com-

pletely exposed by the machinery of a steam engine—in a third, a *complete* dislocation of the knee, in which the leg was turned outwards and placed at right angles with the thigh, produced by the limb being entangled in the spokes of a carriage wheel, and yet the patients all recovered in a very short time.* On the other hand, I may state, that I once saw a patient, apparently in good health, die from amputation of the finger in the Edinburgh Infirmary, and in another instance most violent symptoms ensue from a trivial wound of a joint of the great toe.

When any of the large joints are opened by an incised, lacerated, or gun-shot wound, there is an immediate discharge of synovia, and this will be a sufficient indication of the nature of the case. It is possible, however, for the surgeon to mistake the fluid contained within the bursæ mucosæ, or within the sheath of a tendon, for the synovial fluid. Sometimes a punctured or penetrating wound extends obliquely into a joint, and the synovia does not escape, owing to the narrowness and length of the passage. The constitution suffers exceedingly in most cases from a wounded joint. A coldness or rigor, with sick stomach, is speedily induced, and this is followed by high fever and delirium, sometimes by twitchings or convulsions, with excessive pain and inflammation in the joint. The synovia is soon increased in quantity and rendered thinner than na-

* These cases all occurred several years ago in Maryland. The dragoon belonged to Captain Littlejohn's troop, and was wounded at the battle of North Point; the second case occurred on board the steam-boat Enterprise, and the third in the family of Mr. Pechin. The last was a boy sixteen years of age and attended by Dr. Taylor and myself.

tural, and in a very short time coagulable lymph is thrown out on the surface of the synovial membrane and ligaments. Suppuration is soon after established, and the matter discharged in great quantity from the wound or from fistulous openings around the joint. Finally the bones become carious, and the patient is either worn out with hectic and irritation, or saved only by amputation. Occasionally the symptoms slowly subside, ankylosis takes place, and an imperfect cure is brought about. At other times the patient is carried off by tetanus after the wound has nearly healed.

“In referring to my notes,” says Dr. Thomson,* “I find that we have taken notice of the principal symptoms that had occurred in more than sixty examples of wounds of the knee joint. Most of these wounds had been inflicted by musket balls; but we saw a few which had been made by canister and grape shot, and also some made by the lance. In a great proportion of the wounds of the knee joint the local and constitutional symptoms were peculiarly severe. Several had died of these wounds, and others were in imminent danger of doing so, before the symptomatic fever should undergo such an abatement as to warrant the amputation of the limb. Great pain, tension and swelling of the joint itself, was usually accompanied with œdema of the foot and leg, and not unfrequently with an erythematous swelling of the whole limb. This erythematous swelling often extended up to the trunk of the body, and rendered it impossible to perform amputation in cases in which the removal of the limb seemed to be the only means by which the life of the patient could be secured.

* Report after the Battle of Waterloo, p. 136.

It terminated in some instances, in extensive abscesses round the knee and in the cavity of the ham, which took the direction sometimes of the thigh and sometimes of the leg. In other instances, this inflammation terminated in erysipelas; and in others again, in gangrene and actual mortification of the foot and leg. In a few instances, it is true, balls had passed through, and in others they appeared to be lodged in the joint, or in the ends of the bones which compose it, without the patient's appearing to have suffered much from constitutional fever or from local inflammation. These instances, however, were rare in comparison with the number of those whose lives were in danger, from the injuries which their knee joints had sustained. In the dissection of several of the knee joints after amputation, I found that the balls in passing through the joints had fractured the ends of the bones, and had occasioned in the synovial membrane and cartilages appearances very similar to those which occur in scrofulous affections of the joints. The cartilages were loosened, in some instances, from the bones; in others, they were partially absorbed; and in the divisions of the cartilages produced by fracture, the edges were rounded off by absorption; the synovial membrane was much thickened in substance, and covered by soft, velvet-like, spongy granulations." Dr. Thomson met with numerous instances of gun-shot wounds of the *ankle joint* after the battle of Waterloo, and from the severe symptoms attending them and from their result, is induced to consider such accidents almost as dangerous as those of the knee.

Treatment of Wounds of the Joints.

It has been well remarked by the judicious Hey, that it is easier to *prevent* inflammation in the joints after a wound, than to arrest its progress when once begun. This maxim cannot be too strongly impressed upon the mind of the surgeon; and guided by it he will instantly adopt the most vigorous measures for the patient's relief. He will draw blood copiously from the system, and by leeches from the vicinity of the wound. Immediately afterwards, a very large blister should be applied over the injured part—barely leaving room for dressing the wound, if daily dressing should be required, which is seldom the case for the first few days. If necessary, the blister may be renewed, or a perpetual blister kept up for some time. The patient should be freely purged, and the most rigid abstinence enjoined. Under this treatment, if carried sufficiently far, even the most desperate injury will be placed in a little time under circumstances most favourable to recovery.

The treatment proper for the wound itself, must depend upon its nature and extent. A simple incised wound which has laid open the joint, may safely be brought together and retained by adhesive straps. If possible, sutures should be dispensed with; but if absolutely necessary, too much caution cannot be observed in avoiding the capsule of the joint, and in confining the stitches to the integuments alone. Under this management, the wound may perhaps heal by the first intention, and thereby save both patient and surgeon a vast deal of trouble.

A *gun-shot* wound of a joint will require a different

kind of dressing; for a wound of this description must necessarily suppurate, and will be weeks or months in healing. The surgeon's first object, in such a case, is to search after the extraneous body; for, however harmless a ball may prove, while lodged in a muscular part or among cellular membrane, in the cavity of a joint its presence cannot fail to excite the most violent symptoms: therefore the probe or finger ought to be introduced in the most cautious manner, and the ball immediately withdrawn if practicable. If it cannot be felt, or if imbedded in the head of a bone so firmly as not to be moved without great violence, it must be left until suppuration takes place, in hopes that it may then be loosened and brought away. In the meantime the orifice of the wound is covered with an emollient poultice, while the measures for preventing or subduing inflammation are pursued with the utmost vigour. After suppuration is fully established and the fever and inflammation have abated or entirely gone, the patient's system will feel the effect of the antiphlogistic plan and rapidly sink. The surgeon should watch this change, and instantly adopt an opposite course—administering a good diet, the mineral acids, to check hectic, and perhaps bark and wine. Throughout every stage of the wound itself, the poultice will be found the most agreeable and useful application. All stuffing with tents must be forbidden.

But besides the treatment pointed out, there is one auxiliary, not yet mentioned, of immense value, especially in the early stage of all inflamed joints—*position*. If the knee is wounded, for example, the limb should be extended, and at the same time *considerably elevated*, in order to drain the blood from it as much as possible and thereby lessen the inflammation. For this purpose pillows, or an inclined

plane well covered with quilts, are placed beneath it; or what generally answers a better end, the foot of the bedstead is raised by blocks to the necessary height. Nothing can be more effectual than this simple plan in all injured or diseased joints, and for a knowledge of it the profession is chiefly indebted to Dr. Physick. The limb is kept *extended*, in order that it may prove more useful to the patient, in case ankylosis should ensue. A contrary position ought, however, to be assumed in wounds of the elbow joint, and for obvious reasons.

When the joints are extensively shattered by grape shot, or bullets, or by machinery, and the external wound extensive, or the principal vessels of the limb torn, there can be no question as to the propriety of amputation; and the sooner the operation is performed the better. But there are other cases in which it will be difficult to decide upon the necessity of such a measure, and these shall be noticed under another head.

Wounded joints seem to have escaped the notice of most surgical writers, but the following works may be consulted with advantage.

Hey's Practical Observations in Surgery, edit. 3d. p. 354—*Thomson's Report*, p. 123. 136. 143. 146. 156, &c.—*Dorsey's Elements of Surgery*, vol. 1. p. 101. edit. 2d.—*Boyer's Surgery*, by Stevens, vol. 2. p. 325—*Hunter's Commentaries*, part 1. p. 69.

For a most interesting and romantic account of a wound of the knee joint, received by General Driesen of the Russian service, at the battle of Borodino, from which the patient suffered the most excruciating torture during four years, partly from bad surgical treatment, especially from the use of large quantities of quicksilver introduced into the wound to *amalgamate* the ball, see *Surgical Observations by Charles Bell*, vol. 1. p. 431.

CHAPTER IV.

ABSCESSSES.

AFTER the general observations on suppurative inflammation and its treatment in a preceding part of the volume, it will be proper to speak of abscesses in particular situations. In so doing, no attention will be paid to the distinctions pointed out by some of the French writers, whose terms—*cold* abscesses and abscesses by *congestion*—if not nugatory, have at least no very definite meaning, and are calculated to create false impressions, inasmuch as they are founded upon the belief that such collections are independent of the inflammatory process—which, we have every reason to think, has a most important concern in the production and propagation of every abscess.

SECTION I.

Abscess of the Antrum Maxillare.

THIS is not a very common disease, but is always painful and difficult to cure. It is met with chiefly among middle aged persons, and arises generally from decayed teeth, which by irritating the lining membrane of the antrum, produce extensive inflammation and large quantities of very fetid matter. Sometimes the roots of the teeth excite ulceration in the lining membrane, and project into the cavity of the antrum. The disease may also proceed from severe colds, affecting either the schneiderian membrane of the nose or that of the antrum itself. The fetor of the matter is so extremely offensive in many instances, that it is hardly possible to remain in the room with the patient, who is also very much annoyed by the circumstance and complains of its flowing into the mouth and throat, especially at night when lying in bed. The disease may exist for many months, or even years, without the surgeon or patient being aware of its nature. A deep-seated, severe pain is felt in the face, which no application to the part will assuage. The teeth also in the neighbourhood of the disease become painful—so much so, that the patient often has them pulled, under the idea of their causing all his distress. Upon these occasions it is not uncommon for more or less matter to flow along the sockets into the mouth—and then the true nature of the affection is discovered. In many instances, however, the face swells gradually, be-

comes deformed, and the walls of the antrum are distended by the matter which eventually is discharged through the cheek.

The frontal sinuses are subject to purulent collections within their cavities, though the disease is rare, compared with that of the antrum. Within the last twelve years I have only met with four cases of the kind. In one of these the matter found its way outwardly, and was discharged at the inner angle of the eye—leaving a fistulous orifice which proved very difficult to heal. All the patients complained of a troublesome, fetid discharge from the nostril, and of a diminution of the sense of smelling.

Treatment of Abscess of the Antrum.

The most simple and perhaps the most effectual operation for the removal of matter collected in the antrum, has been practised ever since the nature of the disease was understood. This operation consists in the removal of one or more teeth corresponding with the floor of the antrum. The third molaris is generally selected, inasmuch as it is situated near the most depending part of the cavity. Immediately after the tooth is drawn, the matter is often discharged into the mouth. In other instances, it becomes necessary to pass a stilet or small trocar into the cavity whence the tooth has been pulled, and push it gradually into the antrum. After the contents have been completely evacuated, astringent injections of oak bark, tincture of myrrh, &c. may be introduced into the antrum by a small

syringe, with a pipe somewhat curved and about two inches in length. The injections should be used four or five times a day, and to prevent the opening from closing too soon, a bit of bougie must be worn—taking care that it be not so small and short as to slip into the antrum. I have known this to happen, and cause the patient great distress before it could be gotten out. When the quantity of matter has so far diminished as scarcely to be perceptible, and the inflammation has subsided, the bougie may be withdrawn and the opening suffered to close.

Sometimes it happens that collections of matter form in the antrum, and yet the teeth remain perfectly sound. To obviate the necessity of pulling such teeth, La Morier of Montpellier proposed to perforate the antrum above the alveolar processes immediately over the third grinder. The disease, however, so seldom occurs, without being accompanied or caused by carious teeth, that such an operation, although practicable, can scarcely ever be rendered necessary.

A third plan for evacuating the purulent contents of the antrum, was proposed many years ago in France by Jourdain and Allouel—to wash out the cavity by means of a syringe carried up the nostril and into the natural opening between it and the antrum. From numerous experiments made to ascertain the feasibility of this proposal, it appeared that the operation was practicable, but so difficult as to be beyond the skill of common practitioners, and besides not so serviceable, even when well executed, as might have been expected. For these reasons it is now seldom attempted, and the old operation of pulling a tooth and perforating the antrum is on every account preferred.

An abscess of the *frontal sinuses* is always very difficult to remove, on account of the remote situation of these cavities. Injections through the nostrils can scarcely be made to reach them, and I have derived benefit from no other source than fumigation with *æthiops mineral*.

On abscess of the Antrum, see *Hunter on the Teeth*, edit. 3d. p. 174—*Fox on the Teeth*—*Jourdain*, in *Memoires de l'Academie de Chirurgie*, tom. 4. p. 357—*Boyer's Traité des Maladies Chirurgicales*, tom. 6. p. 149—*Bordenave*, sur les *Maladies du Sinus Maxillaire*, in tom. 12, of *Memoires de l'Academie*, p. 1.

SECTION II.

Mammary Abscess.

THIS disease is not peculiar to lying-in women, although more commonly met with among them than others. Males are also subject to a similar affection. When suppuration forms soon after delivery, it proceeds from cold or a large accumulation of milk, which by distending the breast irritates and gives rise to inflammation. It is seldom, however, that an abscess forms until five or six weeks or even two or three months have elapsed. A swelling of the breast, accompanied by throbbing and pain, and soon followed by coldness or a severe chill, are the first symptoms. To these succeed restlessness, thirst and fever. Soon after the breast enlarges in every direction, becomes very tense and so exceedingly painful that the patient can scarcely bear the pressure of her own clothes. The secretion of milk is interrupted altogether, or its appearance and properties very much altered. Suppuration is generally established in eight or ten days; but sometimes the process goes on for several weeks, during which intolerable suffering and distress are experienced. The matter is not always collected in one cavity, but may be lodged in separate cysts. One of the most common causes of mammary abscess in this country, so far as my observation extends, is the practice, very common among nurses, of feeding women immediately after delivery upon nutritious articles of food, seasoned with wine and other stimulating ingredients

—instead of observing a strict regimen and taking such precautions as are indispensable to obviate inflammation.

A variety of mammary abscess, particularly noticed by Hey, of which I have seen two or three examples, is now and then met with. It begins like the common mammary abscess, but verges with less rapidity towards suppuration. The matter is often discharged from several openings, and these openings become fistulous and lead to narrow sinuses, which wind in every direction among the cellular membrane and glands of the breast. These sinuses, when opened, are found nearly filled with a soft purple fungus. The disease may last for a very long time, and indeed there is reason to believe will never get well spontaneously, but gradually continue to grow worse until the patient's constitution is worn out by hectic.

Treatment of Mammary Abscess.

It is very important, particularly among puerperal women, to prevent the formation of matter in inflammation of the breast, or in the common language of surgery to procure resolution. This may frequently be done by judicious treatment. The most effectual remedies are repeated applications of warm vinegar, topical blood-letting by *leeches*, and gentle suction of the breast by the mouth or nipple-glass. General blood-letting is frequently inadmissible amongst lying-in patients, but may be employed nevertheless, provided much fever be present. Purgatives, in all cases, will be found highly useful, and abstinence indis-

pensable. By these means, together with various local applications, I have frequently succeeded in preventing suppuration. When we find, in spite of all our exertions, that suppuration *must* take place, we immediately discontinue resolvers, and endeavour to bring the matter to the surface as quickly as possible. For this purpose warm poultices are most useful. When the matter is deeply seated, and approaches the surface very slowly, and the patient is much reduced by severe pain and sleepless nights, an opening with a lancet or bistoury may become necessary, and should be made in a depending part of the breast. The poultice must be continued until the discharge nearly ceases, and then superficial dressings will complete the cure. If sinuses remain, pressure by a roller well applied will soon obliterate them.

In the variety of mammary abscess described by Hey, it is recommended to lay open each sinus completely; without which, it is stated, a cure cannot be accomplished. If I may judge from the result of two very extensive and obstinate cases of the disease, which fell under my care a few years since, this severe proceeding may be dispensed with, and a *seton* substituted in its stead. Both patients recovered under this treatment in a very short time. A separate seton was placed in each sinus.

See *Pearson's Principles of Surgery*, p. 77—*Underwood's Surgical Tracts*, p. 252—*James on Inflammation*, p. 171—*Hey's Practical Observations*, edit. 3d. p. 522.

SECTION III.

Hepatic Abscess.

IN warm climates, particularly the East and West Indies, where acute and chronic hepatitis are very common complaints, abscess of the liver is often met with; but, in this country, is comparatively rare. The liver may suppurate, however, from other causes than common hepatitis—as from blows or injuries of the head,* from biliary concretions, and from the presence of worms in the biliary ducts. A remarkable instance is recorded by Kirkland, of an abscess formed on the left side about the lowest false rib, from which was discharged a large red worm. “The tumour had broke,” says he, “and discharged a considerable quantity of matter before I saw the man, and the ulcer had degenerated into a fistula; but by the quantity of bile that daily came away along with matter, the source of the disease was evident. I dilated the orifice a little, to give a free exit to the discharge, and in three or four days afterwards a living worm showed itself, which was taken away, and the sore healed in a moderate time. The man could give no account of his feelings, except that he had a deep dull pain and uneasiness in his left side, below the chest, some time before the gathering appeared; I therefore could not help suspecting, that the worm had entered in at the duct in the duodenum, and crawled to the opposite side through one of the branches

* Bertrandi de Hepatis Abscessibus

of the hepatic duct.”* The late Dr. Thomas Bond,† of this city, has detailed a very interesting and extraordinary case (of a Mrs. Holt, who died, after suffering above eighteen months,) of a disease of the liver, occasioned by a worm, twenty inches long and one inch in diameter. Upon dissection, a cavity was found in the external part of the liver, containing nearly two quarts of a fluid mixed with coagulated blood. A very beautiful preparation, made by the late Dr. Wiesenhall of Maryland, of a liver, the substance and ducts of which are filled and perforated in every direction, by numerous and very large lumbrici, which destroyed the child by irritation and suppuration, is contained in my surgical cabinet deposited in the University.

Fontanelles‡ has lately recorded the case of a boy, thirteen years of age, in which death took place after an illness of ten or fifteen days, from the lodgment of a lumbricus, six inches long, in the ducts of the liver. “The worm was found to have penetrated the ductus communis choledochus, reaching as high as the ductus cysticus and ductus hepaticus. The ductus communis was rent by the worm, the head of which came out through a hole in the ductus hepaticus.”

From whatever cause abscess of the liver proceeds, it is characterized by deep-seated pain and swelling in the right side, and in the advanced stage of the disease sometimes

* See Kirkland's Inquiry into the present State of Medical Surgery, vol. ii. p. 186.

† See London Medical Observations and Inquiries, vol. i. p. 68.

‡ Johnson's Medico-Chirurgical Review, vol. 8. p. 287.

by fluctuation which may be felt externally. As in hepatitis, the patient cannot lie, without an increase of pain, upon the left side; and there is always more or less pain in the right shoulder. Rigors precede and accompany the suppurative process, and in a little time the patient's strength is much reduced by irritation, hectic, and not unfrequently by large quantities of purulent matter from the intestines. There is reason to believe, indeed, that in most instances a communication is formed between the intestines and liver, or between the abscess and biliary ducts, through which the matter is poured into the intestines and passes off by stool. In other cases an ulcerated opening is established between the liver and diaphragm, and the pus is discharged into the chest or coughed up from the lungs. By whatever route the matter escapes, whether through the abdominal muscles or by the internal passages mentioned, it generally happens that through the medium of the adhesive process it is enclosed in a cyst, and so separated from the adjoining parts as to prevent all danger of effusion. Sometimes, however, effusion actually takes place from rupture, ulceration, or the want of adhesion; and then the patient dies in a very short time. After the pus has been discharged externally, whether spontaneously or by art, it soon changes its colour and consistence, and becomes sanious, fetid, and ill-conditioned. Many years ago I attended a patient, in consultation with Dr. Coulter of Maryland, from whose right side, between two of the ribs, a large quantity of healthy purulent matter was discharged, which in a few days became so changed in colour as to resemble coffee-grounds, and so continued for several months, when the patient died—worn out by hectic and debility. Upon dissection, the fistulous orifice in the side was traced into the

liver, or rather into its remains; for the substance of the liver had disappeared, and nothing of its structure could be found except a shell or cyst, somewhat larger than an egg and filled with the same kind of brownish matter. Similar appearances have been reported by authors.

Treatment of Hepatic Abscess.

Few patients recover, after matter has been discharged into the chest or passed off by the bowels; and all that can be done, under such circumstances, is to protract the life of the sufferer by appropriate nourishment and medicine. When the matter collects in the external part of the liver and makes its way towards the surface of the body, the event is more likely to prove favourable, and many have recovered after large quantities have been discharged through the abdominal muscles.

Surgeons were much in the habit formerly of waiting for the spontaneous opening of the abscess; but experience proves, that the patient's chance of getting well is proportionably increased by an early evacuation of the matter. On this account it is now a practice, almost universal among surgeons in India, to make an incision through the intercostal or abdominal muscles as soon as the slightest swelling can be perceived, or indeed without any swelling being evident, provided the nature of the disease in other respects be well ascertained. The operation may be performed with a common lancet, bistoury, or trocar, and requires very little skill. After the discharge of the matter the pa-

tient's strength should be supported by tonics and a good diet—taking care at the same time, not to permit too liberal a supply of food, as the appetite of convalescents from this disease is often voracious, and from being unrestrained has, in too many instances, brought about a relapse and fatal termination. The external wound should be healed as soon as the discharge has so far diminished, as to render its reproduction improbable; otherwise a fistula is apt to form.

See *Lassus' Pathologie Chirurgicale*, tom. I. p. 144—*Kirkland's Medical Surgery*, vol. 2. p. 185—*Bertrandi, de Hepatis Abscessibus qui venteribus Capitis superveniunt*, in *Memoires de l'Academie de Chirurgie*, tom. 9. p. 130—*Curtis on the Diseases of India*—*Barry's Case of an Ulcer in the Lungs piercing through the Diaphragm into the Liver*, in *Edinburgh Medical Essays*, vol. 1. p. 273—*Similar Cases by Kite and Farquharson*, in the *Lond. Med. Communications and Lond. Med. Memoirs*.

SECTION IV.

Lumbar Abscess.

Psoas or lumbar abscess, although common in Europe, is rarely met with in the United States. That this assertion is correct, will perhaps be admitted, when I state that I have seen only four cases of the disease during the last sixteen years, although professionally connected with extensive hospitals and alms-houses during the greater part of the time.* In Great Britain the complaint is so frequent, that it is hardly possible to pass through the wards of any common infirmary, without meeting with several cases.

The symptoms are pain in the lumbar region, extending from the kidney down the outside of the thigh—the testicle of the affected side is drawn up, and there is more or less uneasiness and pain throughout the course of the spermatic cord. The patient is fatigued upon taking the slightest exercise, and whilst in bed relaxes the muscles of the thigh and leg in order to relieve partially the uneasiness which is constantly felt. These symptoms often continue for several months nearly stationary, and then a change is observed, which is indicated by rigors, loss of appetite, and other symptoms of hectic, denoting the formation of matter. In the neighbourhood of the psoas muscle there is abun-

* Dr. Physick informs me that he never met with a case of psoas abscess in America unconnected with disease of the *spine*

dance of adipose substance; this is filled and surrounded by matter in such a way as to separate many parts from their connexions, and to form a cyst, extending in many instances considerably below the groin. Sometimes the matter drops down near the rectum, or passes through the ischiatic notch. In whatever situation the tumour presents, it may be felt soft and fluctuating—projecting in the erect, and receding in the recumbent posture.

The consistence and colour of the matter, in some instances, do not differ from common pus; but generally the fluid is thin and gleet, and mixed with small flocculi, or with lumps resembling curds or cheese. After a time ulceration takes place in some part of the swelling, and the matter is suddenly discharged in large quantity, weakening the patient so much that he cannot survive more than a few days: or else the contents of the cyst are poured off gradually through a narrow aperture, and in this way the patient's life may be protracted, or a spontaneous cure brought about.

The causes of this complaint are very obscure. It occurs chiefly among the lower orders of people, such as are scantily fed and clothed, and exposed to vicissitudes of weather and great hardships. In Britain it is said to be more common among serofulous persons than others, and that adults are more subject to the disease than children. Sometimes the vertebræ become carious, but whether antecedently or subsequently to the formation of matter, is not easily determined.

Treatment of Lumbar Abscess.

Very few patients recover from this disease under any circumstances, and those that escape remain puny and debilitated. In the early stages it may relieve the patient, and perhaps check the progress of the disease, to employ purgatives, blood-letting and low diet; but as soon as the formation of matter is indicated, these remedies should be laid aside, and an opposite mode of treatment adopted.

Formerly surgeons were in the habit of making a large opening in the abscess; but the ill consequences which almost invariably followed, caused the practice to be abandoned. Kirkland was among the first to state, that the patient had the best chance of getting well when the abscess opened spontaneously, and the matter drained gently off through a very small aperture; and it was probably a suggestion of this kind which led Mr. Abernethy to propose a *small* and *valvular* opening—a practice which experience proves to be generally more successful than any other. It is stated by Mr. Pearson, however, that in comparing the result of the different modes of treatment in his own practice, a greater number of patients have recovered, where the matter has been suffered to escape of its own accord.

Crowther has recorded four or five cases, which, without discharging the matter, he succeeded in curing, by means of *large blisters* over the swelling, kept open for a considerable time by the *savin* cerate. A similar plan should always be tried, and if ineffectual, the operation recommended by Mr. Abernethy ought, I conceive, to be pre-

ferred to any other. This consists in making an opening at the most pointed part of the tumour with a common lancet, barely sufficient to permit the escape of flocculi or lumps of coagulated blood, which are apt to collect within the cyst, drawing off a small quantity of matter, and then healing the orifice by the first intention. In a week or two, or when the matter collects again in sufficient quantity, the operation must be repeated, and performed afterwards as often as the case may require, always taking especial care to close the opening after each puncture with sticking plaster. By draining off the matter in this gradual way, the sides of the upper part of the cyst coalesce, in proportion as the contents settle towards the bottom, until the cavity is entirely obliterated and a cure effected.

See *Kirkland's Medical Surgery*, vol. 2. p. 199—*Pearson's Principles of Surgery*, p. 102—*Abernethy's Surgical Works*, 1819, vol. 2. p. 132—*Crowther's Practical Observations on the Diseases of the Joints*, p. 204.

SECTION V.

Femoral Abscess.

I HAVE met with several cases of deep-seated, purulent collections under the *fascia lata* of the thigh, where the disease has assumed a regular form, attended with uniform symptoms. Similar cases are mentioned occasionally, but the disease is not treated of by systematic writers. Children from six to twelve years of age, so far as my observation extends, are more subject to this complaint than others. There is always pain extending from the top of the thigh down to the knee, and generally in the course of the rectus muscle, so much resembling rheumatism that it is commonly mistaken for that disease. To relieve the pain, the patient bends the thigh on the pelvis and the leg on the thigh, and in this position the limb is constantly kept. More or less swelling is soon perceived. This is extremely hard and unyielding, and for the most part is situated a little above the middle of the thigh. The pain increases with the swelling, and in the advanced stages of the disease is so extremely severe, that the patient finds it impossible to sleep even under very large doses of opium. The constitutional symptoms also run very high, and in a little time a complete hectic is formed. The thigh continues to swell, and eventually the tumour often extends beyond the knee. A very large quantity of matter may accumulate beneath the fascia, without any perceptible fluctuation being evident, owing to the dense and unyielding

structure of that membrane, which does not take on ulceration, but opposes the progress of the abscess towards the surface so effectually, that in one case to which I was called, after the disease had existed for three months, the matter had travelled along the leg and been discharged near the ankle—leaving the muscles of the whole limb completely dissected, and the patient so reduced as scarcely to be alive. Care must be taken not to confound this disease with psoas abscess.

Treatment of Femoral Abscess.

In the commencement of this disease I have usually resorted to *blisters*, frequently repeated, or kept open for a week or ten days by savin cerate. Sometimes I have established a large issue in the most prominent part of the tumour; and under these modes of treatment the matter has not formed or has been dispersed in a short time. But, in most instances, before the surgeon is called, the thigh is so completely filled with pus, that nothing less than an operation will answer. Kirkland, who has slightly noticed this affection, seems to recommend an incision on the outside of the thigh, throughout its whole length; whilst Mr. Charles Bell condemns a large opening as likely to produce most violent symptoms, and even death. In all the cases which have fallen under my care requiring an operation, I have pushed a common sized lancet into the thigh through the fascia, when the matter has immediately followed to the great relief of the patient. After this I have introduced a tent into the opening, and bandaged the whole

limb as firmly as could be borne. Notwithstanding this treatment, large quantities of matter have continued to be secreted for some time, and in a few instances a fistula has remained and could only be cured by strong injections and a tight roller.

See *Kirkland's Medical Surgery*, vol. 2. p. 268—*Charles Bell's Operative Surgery*, vol. 1. p. 2.

SECTION VI.

Paronychia or Whitlow.

THIS is a very common and frequently a most severe affection, commencing in the extremities of the fingers, in the form of a small abscess, and sometimes extending gradually upwards so as to involve the hand and forearm. The toes also are not entirely exempt from the disease. Authors have enumerated several species of whitlow, though it appears to me without much propriety. There are certainly varieties of the complaint, but most of them originating perhaps from the same cause, and differing only in situation. Most writers describe four species, the first of which is said to be seated under the cuticle, near the root or side of the nail,—the second, in the cellular membrane, under the cutis,—the third, in the theca, or sheath of the flexor tendons, about the fingers, hand, or forearm—and the fourth, in the periosteum, or between the periosteum and bone. Even these varieties, however, are in a great measure arbitrary; for it is not always in the power of any surgeon to declare, from examination of the part, what particular texture is affected. So far as I have observed, indeed, the symptoms are nearly the same in all cases; more severe in some than others; especially when the pus travels along the sheath of the tendons up the forearm.

In ordinary cases a pungent, deep-seated pain is felt in the end of the finger, which is soon succeeded by consi-

derable swelling. The pain increases with great rapidity, and in a little time becomes so intolerable that the patient is kept awake in some instances for whole days and nights together. Indeed, instances are recorded of delirium and even death from this apparently trivial complaint. Although the inflammation is rapid in its progress, and attains an enormous height, yet the suppurative process goes on tardily, so much so that weeks not unfrequently elapse before fluctuation can be perceived; and even after the pus has accumulated, it is so confined by fasciæ and tendinous sheaths, as to render its escape almost impossible, and its diffusion internally inevitable. On this account we very often find the bones bathed in matter and rendered carious, and the tendons and muscles separated from each other and completely undermined. Sometimes the ravages of the disease do not extend beyond a single phalanx; at other times the whole finger is destroyed, and several of the contiguous joints in succession.

Paronychia may be traced generally to some local injury, —such as pricking the finger with a needle, or splinter. Persons engaged in such occupations as require frequent immersion of the hands in warm water and other fluids, are very subject to it. Often its cause is perfectly unintelligible.

Mr. Pearson has described what he calls the *venereal paronychia*, and lately Mr. Wardrop has given a detailed account of a particular disease under the title of *onychia maligna*. How far these differ in reality from ordinary whitlow remains to be proved.

Treatment of Paronychia.

Venesection, both general and topical may be required in the early stages of whitlow; leeches especially prove very serviceable in all cases, by abating pain and reducing the inflammation. These remedies, however, are seldom sufficient to procure resolution; but this has often been accomplished by the early and repeated application of a *blister*. On the other hand it must be stated, that many patients derive no advantage whatever from the blister; though the same applications, I have observed produce very opposite effects on different patients; thus I have known common linseed oil, spread over a whitlow, afford instantaneous relief in some cases—and in others, so far from proving beneficial, aggravate all the symptoms. Soft soap or common brown soap, warmed and applied to the affected part, occasionally acts in a wonderful manner—assuaging the pain and subduing the swelling in a very short time. Poultices sometimes give relief, and are useful always in softening the skin and removing tension, but when the swelling is very great, the pain intense, and matter evidently formed, the most effectual mode of easing the patient is to lay open the part freely with the knife. From the wound a large and painful fungus is apt afterwards to arise, and the same happens after a spontaneous opening of the abscess. In either case its growth must be repressed by lunar caustic and other escharotics. *Opium* given in repeated doses is essential during the height of the pain. After the matter has ceased to flow copiously, and the inflammation has subsided, the sores may be dressed with lint and mild ointments. Any portion of carious bone may be picked away

cautiously. Amputation is seldom necessary in this complaint, inasmuch as the phalanges of the fingers separate spontaneously at the joints, which, when the disease is arrested, heal up and form an appropriate stump. When matter collects in the hand and forearm, several different openings will be required.*

For the removal of the onychia maligna Mr. Wardrop recommends the evulsion of the nail, and subsequent application of caustic. When these fail, amputation becomes necessary. The venereal paronychia is treated by Mr. Pearson, in the incipient stage, by no external applications—the part being merely covered with a fine linen rag. After the matter is discharged spontaneously, equal parts of balsam of copaiba and thebaic tincture prove serviceable.

* Dr. Perkin of this city has frequently succeeded, it is said, in removing whitlows in a very short time, by an admixture of equal parts of corrosive sublimate and white vitriol, applied to the part on lint steeped in tincture of myrrh, and suffered to remain for several days. I have tried the remedy in several instances, but cannot say that it has answered my expectation in any one case.

See *Pearson's Principles of Surgery*, p. 87—*Wardrop on Onychia Maligna*, in *Medico-Chirurgical Transactions*, vol. 5. p. 135—*Dorsey's Surgery*, vol. 2. p. 292.

CHAPTER V.

ULCERS.

THERE is no class of surgical diseases in which the student should feel a more lively interest than that of ulcers—both in a pathological and practical point of view. In the one case, he has fair opportunity to speculate upon the important processes of animal decay and reparation; in the other, to exert his utmost ingenuity to overcome difficulties which the best surgeons in every age have felt and acknowledged—the obstinate, and oftentimes intractable nature of the complaint. Strange as it may appear, however, so little attention is paid by most students to this department of surgery, that it is hardly possible for the prescribing surgeons, or clinical lecturers, in the Philadelphia Alms-house, (one of the finest establishments perhaps in the world, as regards the number of patients and the variety of disease,) to interest a class by any observations they may make on the subject, or by any cases they can exhibit. But this feeling, amounting almost to prejudice and disgust, is not peculiar to the members of the profession in this country; it is noticed and complained of every where, and arises doubtless from the loathsome condition in which ulcers are generally found—such diseases being most common among the lower orders of people, especially the intemperate and filthy. There is another reason too, I am convinced, which has had great influence in preventing that attention to ulcers they deserve—the unsatisfactory, complicated and adverse distinctions made by almost

every writer. This is so conspicuously the case, that the student can hardly take up any common treatise on the subject without finding himself immediately involved in a labyrinth of perplexities; and if he proceed so far as to understand, as he supposes, the views of the writer, and attempts to apply them to practice, all his conceptions vanish in a moment, and he only knows that there is an ulcer before him without being able to say to what class or species it belongs. This confusion, it appears to me, has arisen from the numerous appellations given by authors to ulcers of the same character, and from very trifling and oftentimes accidental varieties being dignified with the name of *species*. Thus the *simple purulent* ulcer, and the *simple vitiated* ulcer of Mr. Benjamin Bell, are the *healthy* and *irritable* ulcers of Mr. Home. Again—what Mr. Home describes as an “*ulcer in parts too weak to carry on the actions necessary for its recovery*,” is called by Mr. Burns the *overacting* ulcer, and by common writers the *fungous* ulcer. The name of *inflamed* ulcer has sometimes been substituted for *irritable* ulcer, and *callous* ulcer for that of *indolent* ulcer. These contrarieties, however, are pardonable and unimportant compared with others which have been adopted almost universally—such as the *sinuous* ulcer, the *carious* ulcer, the *fungous* ulcer, the *sloughing* ulcer. These, it must be evident to any practitioner much accustomed to the treatment of ulcers, are accidental symptoms merely, or at farthest variations which are not peculiar to any particular species, but may accompany or follow all.

After these remarks, it will be proper to attempt a classification of ulcers calculated to obviate the objections that have been urged. This may perhaps be accomplished by an arrangement approaching to that of Home, but differing

from it chiefly in being more simple and intelligible. With this view, I shall arrange all ulcers under three classes—*healthy*, *unhealthy*, and *specific* ulcers. The first class comprehends but one species; this I shall call the *simple* ulcer. The second contains two species—the *irritable* and *indolent* ulcer. Under the third class may be arranged several species, the principal of which are ulcers from scrofula, cancer, fungus hæmatodes, and syphilis. To these might be added, perhaps with propriety, the *syphiloid*, *scorbutic*, *herpetic*, and *contagious** ulcer. The ulceration that attends *lupus*, or that particular disease called *noli me tangere*, may also rank as a species of specific ulcer.

* Usually denominated Hospital Gangrene.

SECTION I.

Simple Ulcer.

THE simple ulcer is the result of some injury done to a sound part, by a wound, contusion, abscess, or burn. It is generally met with in young and healthy subjects, and may occupy any part of the body. The surface of this ulcer exhibits a florid appearance, owing to the small, pointed, and numerous bright red granulations, which cover it in every direction. In a little time small white patches may be observed, on the top of these granulations, first near the edge of the old skin, and afterwards in the middle and other parts of the sore. These lay the foundation of a new cuticle. From the sore there is always discharged a white, thick, inodorous pus, small in quantity and easily wiped away. Provided the constitution remains sound, and no additional injury is sustained by the ulcer, it will generally heal in a very short time; but it is possible for such an ulcer to become diseased, and then, according to circumstances, it may take on the irritable or indolent character.

Treatment of the Simple Ulcer.

As the natural tendency of this ulcer is salutary, the only remedies required are such as will defend it from external injury and prevent evaporation of the pus. Keep-

ing the patient in a horizontal position, if it be an ulcer of the leg or foot, elevating the limb upon a pillow or moderately inclined plane to facilitate the return of blood, and barely covering the sore with some mild and fresh ointment spread on lint or on a fine linen rag, will often effect a cure in a few days. The simple ointment and Turner's cerate I have found the most useful. Dry lint is an excellent application in most ulcers of this description. It should not cover the whole sore, but chiefly its centre—the edges being protected by small slips of linen spread with cerate. Some patients complain of dry lint, as too stimulating and adhering so closely to the granulations as not to be removed without giving pain. In such cases, I have usually found a cold bread and milk poultice a very soothing and useful application. Mr. Home condemns the employment of poultices altogether in this species of ulcer. Few ulcers of the simple species will bear pressure either from a roller or adhesive straps. In some particular constitutions, applications which keep the surface of the sore moist do mischief; in these cases, the ulcer will often heal by exposing it to the air and permitting it to form a scab.

SECTION II.

Irritable Ulcer.

THE irritable ulcer is the first species of the class of unhealthy ulcers, and is generally characterized by the following appearances and symptoms. The edges of the sore are ragged, undermined, and sometimes almost serrated. The parts for some distance beyond the ulcer are red and inflamed, and often œdematous. Irregular hollows occupy the bottom of the ulcer, and contain a thin, greenish or reddish matter, which is so extremely acrid as to excoriate the adjoining skin. In place of granulations may be found a white or dark red spongy mass, extremely painful and shedding blood upon the slightest touch.

Although the irritable ulcer generally proceeds from local causes, it is influenced, in most instances, materially by the state of the constitution and habits of the patient. The digestive organs in particular, as I have often witnessed, are very apt to be disordered in persons afflicted with the irritable ulcer, whether primarily or secondarily cannot always be ascertained. Commonly also this ulcer is met with in persons of nervous or irritable temperament. Hence the disease is by no means unfrequent in the higher classes of society, particularly amongst epicures, huge feeders and debauchees. When seated in the leg, as usually happens, the patients suffer immensely from pain, which is most severe at night, and sometimes attended with

spasms of the limb. Irritable ulcers are generally situated on the fibula, immediately above the ankle, where, without penetrating far, they soon expose the bone, and quickly render it carious if not arrested by appropriate remedies.

Treatment of the Irritable Ulcer.

When we have reason to believe that an irritable ulcer proceeds from or is kept up by some derangement of the digestive organs, immediate recourse must be had to steady purging and nauseating doses of antimonials. It is astonishing how much may be done for local diseases in this way, and for foul irritable ulcers especially. I am very sure, from considerable experience in this branch of surgery, that more benefit is to be derived in many such cases from a few doses of medicine judiciously administered, than from all the local applications that can be thought of. I cannot, however, speak in the same terms of blood-letting, which some have highly recommended; indeed, very few cases of irritable ulcer have fallen under my notice requiring this operation.

As most patients among the lower orders come into hospitals and alms-houses with their ulcers inflamed and in a very foul state, the best local application to begin with is a *warm poultice*, just large enough to cover the sore, and not so large as by its weight to create pain. Much will depend upon the condition of the ulcer as regards the continuance of the poultice. Generally the patient's pain is soon relieved by the application, and the ulcer improves rapidly

under it. But in four or five days the surgeon will find it expedient, in most cases, to lay it aside and substitute some other dressing. As long, however, as the poultice agrees with the ulcer it should be continued, even until cicatrization is completed. The carrot often forms an excellent poultice for the irritable ulcer. It should be finely grated and applied in a raw state, or boiled to a soft pulp.

Fomentations are highly extolled by some writers, but the difficulty of application renders them almost useless. Unctuous substances disagree with the irritable ulcer, except the materials be extremely mild and perfectly fresh. Mr. Home highly praises common cream in those irritable ulcers with which warm applications disagree. After the sensibility of the ulcer has diminished, a weak solution of the argentum nitratum will be found one of the best applications that can be employed. Opium given internally, mixed with poultices, or sprinkled in the form of powder over the sore, is well adapted to remove pain, and is frequently indispensable. The elevated position of the limb, and perfect rest, are essential in this species of ulcer. Every thing like pressure and bandaging must be avoided.

SECTION III.

Indolent Ulcer.

THE indolent is the most common of ulcers, and is almost peculiar to filthy, dissolute and intemperate persons. It is the species of ulcer with which the wards of almshouses and hospitals are crowded, which is so frequently seen amongst common soldiers, sailors, and people in the ordinary walks of life. From the simple and irritable ulcer it differs materially, both in symptoms and external character. The granulating surface has a flat and shining aspect, and is covered partly with a pellicle or crust of a whitish or dark grey colour, so tenacious as to be inseparable from the ulcer without considerable force. Sometimes the sore is perfectly dry or free from matter, but generally there is a profuse discharge of a viscous, cohesive fluid, intermediate between pus and coagulating lymph. The edges of the ulcer are elevated, protuberant, smooth and rounded; hence a very deep cavity is apparently formed, when in reality the base of the ulcer is very little below the level of the sound skin. For a considerable distance beyond the ulcer the parts are swollen and indurated, and the whole limb enlarged. In nine cases out of ten the leg is the seat of the indolent ulcer, and the nearer the disease approaches the ancle the more difficult it is to cure. So trifling is the pain in most instances, that the patient is hardly sensible of the existence of the sore.

It is possible for the simple or irritable ulcers, from neglect or bad treatment, to become indolent, and assume all the appearances just described, or the indolent ulcer may exist from the first independently of the others. In that case the external characters will differ in some respects, from those pointed out as peculiar to the disease in its advanced stage. The granulations are pale, flabby, large and rounded, bleed from the slightest scratch, and rise oftentimes in a fungous form above the level of the skin. This is what Mr. Home would term an "ulcer in parts too weak to carry on the actions necessary for its recovery," and what is usually denominated by writers the "*fungous ulcer*," but which in reality, is the first stage, or at any rate a variety only of indolent ulcer. This variety may, and often does, accompany an ulcer with carious bone, sprouts from the mouth of a sinus or covers the surface of many specific ulcers. From whatever source it springs its characters are uniform, and its disposition so truly indolent, that it cannot without impropriety be referred to any other head.

Another variety of the indolent is the *varicose ulcer*, or that disease which sometimes precedes, at other times follows, a varicose enlargement of the veins of the leg and thigh. This has been looked upon by some as a particular species, but its characters in most respects are so allied to those of the common indolent ulcer, that it ought not to be placed in any other rank. The cavity of this ulcer is not unusually deep, and its bottom presents nearly the same appearance as the indolent ulcer in its advanced stage; the edges of the skin, however, bounding the sore are not tumid. In shape the ulcer approaches to the oval, with its

longest diameter vertical. The pain is not acute, but rather deep-seated and extending along the venous trunks. These trunks are distended and knotted, in some cases, quite to the groin, and their branches displayed in endless tortuosities over the whole leg. The ulcer itself generally occupies the inner side of the leg.

Treatment of the Indolent Ulcer.

When the indolent ulcer has continued for months or years, and the patient's constitution is enfeebled by disease or worn out by intemperance, very little benefit may be expected from any mode of treatment. Almost every surgeon has met with cases of this description; and it is by no means uncommon, on the other hand, to see stout and healthy looking patients walking about or lying in the wards of an alms-house, with one or both legs covered with large and insensible sores of twenty years standing, which have been brought at different periods almost to a close, but in a few days have broken out afresh and become as large as ever. Many such patients are to be found, in Europe especially, who nourish their diseases to gain a livelihood by begging, or to secure a permanent abode in some public charity. In this country too, I have known patients to irritate their sores by pricking them with pins through the bandages, in order to prevent the healing process.

As soon as an ulcer shows a disposition to become indolent, which may be known in recent cases by the rounded and fungous form of the granulations, the surgeon should

resort, without delay, to escharotics, adhesive straps, or the roller. Under this treatment a cure will often be accomplished in a few days. When the sore has become so truly indolent or callous, as to remain insensible under the strap and bandage, additional means should be employed. The edges must be pared away by the knife, and the whole surface pencilled with the vegetable or lunar caustics. By these means the older surgeons often succeeded after the failure of all other remedies. There are many ulcers of the leg which burrow in the cellular membrane and spread extensively, owing to the fascia beneath them remaining entire. Such sores seldom heal until the fascia is slit up or pared away. In general the best application to begin with, when the indolent ulcer is very foul, is a common poultice of bread and milk or linseed, followed up by an oak bark poultice, and continued two or three days. After this adhesive straps, the leg being previously shaved, may be applied in such a way as not to encircle the whole limb, but two-thirds merely—care being taken to leave spaces for the escape of matter. Over the straps, beginning at the toes, we place, with moderate firmness, a cotton, flannel or serge roller, and continue it up the limb as high as the knee. Under this treatment, the sore improves so rapidly that the patient is frequently able to walk about and attend to his business, without the exercise interfering with the cicatrization. Experience proves that sores healed in this manner are less apt to break out again, than those cured by rest and the horizontal position. There are some patients, however, that cannot take exercise without its occasioning an increase of the ulcer; though there is reason to believe, that this arises too frequently from an improper or slovenly mode of applying the bandage and straps.

Many ulcers require, in addition to pressure, highly stimulating applications,—such as repeated touches with lunar caustic, savin in powder or mixed with yellow basilicon, cantharides, capsicum and other varieties of pepper, the gastric juice of animals, decoction of walnut leaves, nitrous acid, unguentum hydrargyri nitrati, corrosive sublimate, camphor, the carbonates and phosphates of iron, &c. Dr. Underwood highly extols the *black basilicon*, and represents it as infinitely more efficacious in all cases than the yellow. With some ulcers, however, milder applications answer a better purpose,—such as rhubarb in powder, either alone or combined with crude opium, tincture of myrrh, &c. But as a general rule in the treatment of all ulcers, the surgeon must not neglect to *change his dressings repeatedly*; for it has been ascertained beyond all doubt, that sores flag, and are put back for weeks, by the improper continuance of a medicine which at first and for a short time, produced excellent effects.

Constitutional remedies often exert great influence over indolent ulcers. In the wards of the Philadelphia Almshouse I have succeeded, in numerous instances, by the use of the blue pill and other preparations of mercury, after most other medicines had been for months ineffectually tried.

Where sinuses exist, well directed pressure by bandages will do a great deal; when these fail, the tract must be laid open by the knife. Fungous granulations are easily repressed by red precipitate, blue vitriol, or adhesive straps. So long as any portion of carious bone remains, the ulcer will keep open in spite of every dressing; in these cases,

the gastric juice, nitrous, and other acids, often prove serviceable, by acting upon and removing the earthy parts of the bone. The surgeon should not be too officious in cutting away bones apparently carious, otherwise he will soon find all the symptoms aggravated, and the bone in a little time rendered *really* carious. Nature is generally more efficient in such cases than art.

The ulcer accompanied by *varicose veins*, will generally heal under adhesive straps, the roller, or laced stocking; but in many instances, these veins become so large as to require an operation, without which every effort on the part of the surgeon to close the sore will prove fruitless. This operation will be described at a future period under the head of *Diseases of the Veins*.

See *Underwood's Surgical Tracts, containing a Treatise upon Ulcers of the Leg*, edit. 3d. 1799—*Whately's Practical Observations on the Cure of Wounds and Ulcers on the Legs, without Rest*, 1799—*Home's Practical Observations on the Treatment of Ulcers on the Legs, considered as a branch of Military Surgery, &c.* edit. 2d. 1801—*B. Bell on the Theory and Treatment of Ulcers*, in vol. 2d. of *System of Surgery*, edit. 7. p. 214—*Thomson on Inflammation*, p. 423—*Roux's Narrative of a Journey to London in 1814; or, a Parallel of the English and French Surgery*, edit. 2d. 1816, p. 127.

CHAPTER VI.

SPECIFIC DISEASES.

UNDER this head I propose to arrange certain diseases which it appears to me cannot be treated of with propriety in any other place, inasmuch as they are closely connected with inflammation and its terminations, and with other subjects discussed in the foregoing pages. Some of these diseases may appear perhaps to belong to the practice of medicine. In a limited point of view this is really true; but it is equally obvious, that a large share of their pathology and treatment must come within the surgical department. Besides scrofula, cancer, fungus hæmatodes and syphilis, there are specific affections not so obtrusive to the senses, but sometimes equally formidable and not less difficult to cure.

SECTION I.

Scrofula.

WITHOUT attempting to explain or reconcile in this place the discordant, multifarious, and too often wild and hypothetical views regarding the nature of scrofula, it may be sufficient to state that we know very little of its origin, of the circumstances respectively calculated to modify the forms and variations under which it appears in the different textures of the body, or of the method of cure. We are perfectly familiar, however, with its effects both constitutional and local, and with the symptoms by which it is characterized.

In most instances, certain premonitory signs noticed by all writers, are very perceptible long before the disease itself becomes evident. The complexion is extremely delicate, of a lively red colour mixed with a beautiful white, the red of the lips approaches to a carnation tint, but the lips themselves, the upper especially, are thick and protuberant. The pupils of the eyes are dilated, and the conjunctiva remarkably clear and free from vessels. The eyelids droop unnaturally, and give to the countenance a melancholy but interesting expression. The head is large and protuberant at the occiput, the neck short, the lower jaw thick and fleshy, the hair and eyes of a light grey or blue colour, the belly swollen and prominent. These signs, taken collectively, undoubtedly manifest the scrofulous con-

stitution; but some of them are at least equivocal, such as the colour of the eyes and hair, which is, perhaps, as often dark as light, and in some instances extremely black.

Children are more subject to scrofula than grown persons, and the disease may show itself at any period between infancy and puberty. It may appear also in almost any texture of the body, and is certainly not, as some authors have imagined, peculiar to the lymphatic absorbent system. But the lymphatic glands undoubtedly are more susceptible of the disease than other parts, especially the glands of the neck and mesentery. Next to these the lungs and spongy parts of the bones are most apt to suffer.

In whatever situation a scrofulous tumour may be met with, it uniformly exhibits the following appearances and symptoms. At first there is simple enlargement without pain or unnatural heat; in a short time, however, the patient complains, if the tumour be pressed upon, and the warmth of the part is sensibly augmented by several degrees. In this state, or without any material change, the disease may continue for months or years, and afterwards disappear spontaneously. Commonly it follows a different course—gradually taking on inflammation, and at last terminating in abscess and ulceration. Long before the abscess breaks the skin assumes a dark purple or leaden colour, and retains it in many instances for a considerable time after the sore has cicatrized. The matter discharged from the abscess is thin, gleety, and mixed with flocculi or small portions of a substance resembling cheese. The discharge sometimes continues for many weeks; in other instances, the openings from which it is poured out rapidly enlarge,

and the whole tumour or its remnant is converted into an ulcer peculiar in appearance and difficult to cure. When a scrofulous abscess follows an enlargement of a lymphatic gland, it might be supposed that the matter was formed within the substance of the gland; this, however, is not invariably the case—the gland sometimes remaining entire and the matter having only formed around it. This particular state is ascertained by the probe, by the circumstance of the tumour undergoing no diminution, and occasionally by the separation and evacuation of the unaltered gland itself. Scrofulous abscesses of large size seldom proceed from a single gland, but from a cluster of glands united by inflammation. When such enlarged masses are seated in the neck, they sometimes by pressure impede respiration and deglutition.

The scrofulous *ulcer* usually puts on the following appearances. The edges are thin, smooth, obtuse, of a pale red or purple hue, and overhang the ulcer, the bottom of which is deep and the granulations loose, indistinct, of a faint rose colour and glossy aspect. From the sore is discharged a thin, curdled, colourless, offensive matter. This ulcer is never painful unless inflamed by rude treatment, improper applications, or carious bones; in that case, the whole surface is changed, becomes of a fiery red colour, accompanied by fungous granulations, elevated and retorted edges, and a profuse discharge of watery matter.

Although the nature of scrofula is involved in great obscurity, there are certain occasional causes which appear to exert considerable influence in bringing the disease into action. These are particular degrees of cold, especially

when conjoined with moisture, irregularities of diet, meagre and unwholesome provisions, an impure or tainted atmosphere generated in crowded manufactories, hospitals and schools, deficient clothing, external injuries, fevers, mercurial frictions, want of exercise, filth, fatigue, mental anxiety, &c. Of all these causes a cold, damp and variable climate is the most powerful in inducing the disease; and next to this, perhaps, derangement of the digestive organs, from improper and particular modes of living. It is well known that Mr. Abernethy, within the last few years, has endeavoured to show by a variety of illustrations, that a great many local diseases derive their origin from disorder of the digestive functions. The same train of reasoning has been applied by Carmichael and Lloyd to the explanation of scrofula, and it appears to me, with very considerable success. With regard to the hereditary, or adventitious origin of scrofula, much diversity of opinion still prevails: it seems to me, however, that the advocates of each side of the question have chiefly erred in admitting the influence of one to the entire exclusion of the other. I have no hesitation in stating that I believe in the hereditary transmission of scrofula, and am at the same time fully persuaded that it may take place in a perfectly healthy constitution when exposed to the influence of the different occasional causes above enumerated.

Treatment of Scrofula.

There can be no stronger proof of the difficulty of curing scrofula, than the circumstance of the immense number of

articles offered at different periods, as constitutional, specific, and local remedies—such as bark, mercury, antimony, cicuta, hyosciamus, belladonna, opium, dulcamara, aconitum, cold and warm bathing, mineral waters, &c.; all of which and many more have been highly extolled by some writers and as pointedly condemned by others. I believe, however, that it is now generally acknowledged that these means, when they do prove serviceable, only act by invigorating the system or by keeping the stomach and bowels loose and free from acidity. If so, a sufficient hint is furnished the practitioner to select those articles best calculated to produce such effects, without incommoding the patient by imparting too much tone, or prostrating him unnecessarily by profuse evacuations. With this view, small doses of mild purgatives, such as magnesia, rhubarb, sulphur, castor oil, and the blue pill, should be prescribed occasionally. Without a strict regard to diet, however, these purgatives will answer very little purpose. It must not be understood that the patient is to live scantily, and on very meagre nutriment; on the contrary, his system should be supported by a light and moderately nourishing diet, consisting chiefly of plain animal food and such other articles as the stomach can easily digest. Conjoined with this treatment, tonics, particularly bark, used alone or combined with the preparations of iron, the tincture of iodine, a decoction of sarsaparilla or of althæa, an infusion of cascarilla, a change of climate, or removal from a cold and damp to a dry and warm situation, flannel next to the skin, covering the extremities as well as the body, and other warm clothing, together with moderate exercise, will do more for the patient, perhaps, than all the reputed specifics ever imagined.

Scrofulous *tumours* or abscesses are seldom benefited by local applications; when very large and indolent, blisters, stimulating liniments, frictions and issues have been used with advantage. The older surgeons often extirpated indurated scrofulous glands, and according to their own accounts with success. Such an operation, however, can very rarely if ever prove necessary.

For the scrofulous *ulcer* many different applications have been recommended. The best, I conceive, are dry lint, mild ointments, the iodine cataplasm, slightly astringent washes and moderate pressure. If the sore should become indolent, the black basilicon, nitrate of silver, and other remedies formerly recommended for the common indolent ulcer, may be required. Dupuytren has used in obstinate scrofulous ulcerations, a powder composed of one hundred and ninety-nine parts of calomel to one of white arsenic, and with very considerable benefit.

See *White on Struma—Burns' Dissertations on Inflammation*, vol. 2. p. 145. edit. 1812—*Hamilton's (of Lynn Regis Hospital) Observations on Scrofulous Affections—Russel on Scrofula*, 1808—*Thomson on Inflammation—Carmichael's Essay on the Nature of Scrofula, with Evidence of its Origin from Disorder of the Digestive Organs*, 1810—*Lloyd's Treatise on the Nature and Treatment of Scrofula; describing its Connexion with Diseases of the Spine, Joints, Eyes, Glands, &c.* 1821—*Alibert's Nosologie Naturelle, ou les Maladies du Corps Humain distribuées par Familles*, tom. 1. p. 441—*Henning's Critical Inquiry into the Pathology of Scrofula*. 1815—*Goodlad's Practical Essay on the Diseases of the Vessels and Glands of the Absorbent System*, 1814.

SECTION II.

Cancer.

NOTWITHSTANDING the numerous treatises on cancer within the last twenty years, and the great encouragement held out by societies for investigating its nature and treatment, we are now almost as much in the dark concerning the disease, as at any former period. All that can be done under these circumstances, is to point out in a general way, the symptoms and appearances which, according to the best writers, constitute the disease, and to notice such remedies only as are acknowledged to possess some efficacy.

By the term *schirrus*, which is usually considered the forerunner of cancer, is understood a preternatural density or induration of the soft parts, not easily resolved and very prone to ulceration. Besides these characters, genuine schirrus is designated by certain external marks, and by a peculiar internal structure. The whole tumour is unequal on the surface, uncommonly heavy, and the skin covering it puckered and of a faint bluish or leaden hue. The pain also is vehement and of a peculiar kind—at first prurient, but afterwards lancinating and compared by many patients to the gnawing of an animal. In a longer or shorter time, the tumour is apt to form adhesions with the integuments above, and the muscles below. In this condition the disease may remain for months or years without material alteration, but eventually the skin cracks in one or more

places, and from the fissures is discharged a thin, acrimonious and fetid matter, which excoriates the adjoining parts, and hurries on the ulcerative and sloughing process. Not unfrequently a large cavity is produced, as it were suddenly, from the whole surface of which there is an immoderate discharge of bloody, ill-conditioned matter, in smell approaching to ammonia. This cavity is rapidly filled up by a hard, irregular fungous mass, which protrudes beyond the edges of the sore, and often bleeds profusely of its own accord, or from the slightest irritation. Around the ulcer thus formed, the skin continues of a purple colour, and its edges remain extremely hard. The surface of the sore is of a dark red colour, and has a peculiar glossy lustre. The margins are elevated and irregularly serrated. Many patients are worn out by irritation and hectic soon after the tumour takes on the ulcerative action, others live for years—the ulcer proving apparently so far beneficial as to arrest temporarily the extension of the disease.

When examined by *dissection* the schirrous tumour exhibits the following appearances. In the early stage a small, very compact, and central nucleus is found, resembling cartilage in consistence, from which radiated and narrow bands proceed in irregular lines towards the circumference of the tumour. These bands are intersected transversely by others of a fainter appearance, and conjointly form a plexus or net-work which encloses a softer and more pulpy substance. However, as the tumour advances towards ulceration, these variations of structure become less distinct and are finally blended together, or else the pulpy matter is converted into a dark fluid of a greenish cast, or of a jet black colour, and enclosed in cysts formed of the

radiated bands. Sometimes these cysts are filled with a perfectly pellucid fluid, are of different sizes, extremely numerous, and resemble exactly the common hydatid. According to Burns, these cavities are never absent, and are to be considered the most certain evidence of the existence of schirrus. When the schirrous tumour is recently removed from the body, and the transparent cyst opened with a needle, the fluid immediately spirts out to a considerable distance, owing apparently to a contractile power in the cyst itself. Such effects have been witnessed by different surgeons, and remarkable instances of the kind are recorded by Le Dran, Carmichael and others.

It is not yet ascertained in what particular texture of the body cancer originates, or whether it be confined indeed to any texture. According to Pearson, the disease seldom if ever commences in an absorbent gland. It is still also a disputed point, whether cancer be a local or constitutional disease. There is so much evidence, however, now extant in favour of the former position as to leave very little doubt on the subject, and indeed to render it very questionable whether cancer ever becomes, strictly speaking, a constitutional affection.

As regards the *immediate* cause of cancer, innumerable hypotheses have been framed. That which approaches nearest to truth, it seems to me, ascribes the disease to animalcular origin, or, as contended by Adams and Carmichael, to the presence of hydatids—thus giving to cancer an independent vitality. This theory will not appear so absurd as some have imagined, when it is recollected that many cutaneous diseases, especially itch, arise beyond all doubt

from insects which may be distinctly seen by the eye or microscope,—that worms are found in the liver, urinary bladder, arteries, veins, among the humours of the eye, and in many other situations where their presence is little suspected.—The *exciting* causes of cancer are often sufficiently manifest. In many instances the disease may be traced to a blow or some other external injury, by which the organization is altered and a predisposition given to morbid action, or in other words, such a condition of the part brought about as to afford a nidus particularly suited to the lodgement and growth of independent beings.*

Treatment of Cancer.

It is now generally acknowledged that internal medicines are incapable of removing cancerous complaints, however beneficial certain articles may prove in arresting their progress and in relieving pain. The same observation will apply, with few exceptions, to all local applications. Without recounting, therefore, the numerous specifics proposed at different periods, it may be observed, that by rigid abstinence, or a close confinement to a very low vegetable diet, amounting to little more than bread and water, and that in quantity barely sufficient to sustain life, schirrous and cancerous tumours have been reduced to so small a compass as scarcely to be perceptible; but the moment the patients have relapsed into their former modes of living, all the symptoms have returned, and often in an aggravated

* See Carmichael on Cancer, p. 273.

form. There are few patients, at any rate, courageous enough to encounter such a system, or to sustain it long enough to produce even temporary relief.—With regard to local remedies, experience demonstrates that such only can be relied on as will eradicate every particle of the schirrous or cancerous mass, and that the *knife* only, or very *active caustics* are sufficient to accomplish this purpose, but often fail from unskilfulness or the advanced stage of the disease. These sentiments, I believe, will accord with those of the most experienced members of the profession; but it is proper at the same time to state, that within a few years past Mr. Carmichael of Dublin, a highly respectable and intelligent surgeon, and one who appears to have enjoyed most ample opportunities of treating cancerous diseases, variously situated and in different stages, unreservedly declares that he has effected complete cures by *ferruginous* and *arsenical* preparations. Hitherto this practice has not been pursued to any extent in the United States; but it emanates from authority so deservedly high as to entitle it justly to a full trial.

See *Pearson's Practical Observations on Cancerous Complaints*, 8vo. 1793—*Home's Observations on Cancer, connected with Histories of the Disease*, 8vo. 1805—*Johnson's Practical Essay on Cancer, being the Substance of Observations to which the annual prize for 1808 was adjudged by the Royal College of Surgeons of London*, 8vo. 1811—*Carmichael's Essay on the Effects of Carbonate and other Preparations of Iron upon Cancer, with an Inquiry into the Nature of that and other Diseases to which it bears a Relation*, 8vo. 1809, 2d. edit.—*Lambe's Reports on the Effects of a Peculiar Regimen on Schirrous Tumours and Cancerous Ulcers*, 8vo. 1815—*Burns' Dissertations on Inflammation*, vol. 2d. p. 177 —*Adams on Morbid Poisons*.

SECTION III.

Cancer of the Eye.

TRUE carcinoma of the eye-ball is seldom met with, though a disease bearing considerable resemblance to it and allied to fungus hæmatodes is not unfrequent. The former occurs chiefly in old, the latter in young subjects. Formerly the two affections were confounded, and then cancer of the eye was considered almost peculiar to children under twelve years of age. Subsequent observations tend to establish the reverse.

Cancer usually commences in the anterior parts of the eye, and speedily destroys vision by involving the cornea, iris, and crystalline lens in one confused mass. The whole globe of the eye is gradually enlarged, and becomes very painful from the distention of its coats and the inflammation which ensues. Soon afterwards the cornea gives way, and a soft, irregular, tuberculated, very vascular fungus sprouts forth, and is so luxuriant as to attain in a short time the size of a large egg or apple—projecting beyond the lids and covering a considerable portion of the cheek. The colour of the fungus varies in different cases, according to the state of inflammation—being in some of a bright red or scarlet hue, in others of a chocolate brown or deep purple cast.

So very vascular and tender is this morbid growth that

the slightest touch is sufficient to induce profuse hemorrhage, and so often does this occur spontaneously or by ulceration that the patient is soon reduced exceedingly low. According to Scarpa, this soft pulpy fungus becomes hard and warty before it assumes a very malignant character. The same writer expresses his belief that the disease, with the exception of the lachrymal gland, never originates in any other texture than the conjunctiva. I have met with one instance, however, in which the *caruncula lachrymalis* was primarily affected, and subsequently the globe of the eye—the disease having extended regularly from one to the other. In another case, that of a gentleman of North Carolina who two or three years ago came to Philadelphia to consult me on his disease, a tumour formed deep in the inner side of the left orbit, and after several years growth pushed the eye forward, and so far beyond its natural limits as to create considerable deformity. A small fluctuating tumour about the size of a marble occupied the upper part of the inner canthus of the eye, and the parts all around this seemed of a stony hardness. I determined, by way of ascertaining the nature of the complaint, to cut through the orbicular muscle and penetrate towards the bottom of the orbit—taking the soft tumour as my guide. After accurate examination, this was found of a deep blue colour, resembling in appearance exactly the common fox grape, and containing a thin fluid like ink, but changeable when exposed to a varied light. This sac and its contents being removed, a solid tumour, which served as the base of the sac, was felt at the bottom of the orbit, surrounding apparently the optic nerve, and was extremely sensible to the touch. It was evident, both to Dr. Physick who assisted in the operation and to myself, that no bene-

fit would result from a further dissection, unless the globe of the eye were also removed. This was not advised, as vision, notwithstanding the protruded state of the eye, was still perfect. The wound was therefore closed and healed by the first intention. The patient returned home, with a determination to submit at a future period to the removal of the whole contents of the orbit, should the eye be disorganized by fungus and other characteristics of cancer. About twelve years ago he fell, whilst walking in a field, upon a sharp-pointed tobacco stalk, which entered at the precise spot afterwards occupied by the encysted tumour: and to this circumstance he attributes his disease.*

Both eyes are seldom affected simultaneously with carcinoma, nor does it often happen that the destruction of one is followed by disease in the other.

Upon *dissection* the cancerous eye commonly exhibits the following appearances. All the coats are very much thickened and indurated, and their interstices occupied by a whitish fibrous mass, intermixed with pulpy matter. The humours are absorbed, or so changed as not to be recognised, and their places filled up by fungus or small cysts containing a transparent fluid. Sometimes the whole cavity of the eye is distended by the same substance that is interposed between the coats. The fungus, when examined minutely, appears to be made up of cells filled with matter resembling the pulp of a decayed pear or apple. In the advanced stages of the disease, the optic nerve is thickened and discoloured often as far as its origin.

* This patient, as I have since ascertained, recovered perfectly.



The drawing in *Plate IV.* affords a very striking illustration of the form and colour of the carcinomatous eye. It was taken from a woman sixty years of age, a few days before I removed from the orbit the whole diseased mass. Although previously much reduced by repeated hemorrhage, she recovered in less than a month, and never, as far as could be ascertained, had any return of the complaint, and lived many years after the operation.

Treatment of Cancer of the Eye.

Nothing less than complete excision of the whole disorganized mass from the orbit will answer any purpose, and unfortunately, in most instances, this operation is so long delayed that the patient's chance of recovery, after he does submit, is exceedingly diminished.

The first step of the operation is to divide the tarsi at each angle of the eye by an incision half an inch in length. This enables the surgeon to separate the lids widely, and thereby to get free access to the conjunctiva and ball of the eye. As soon as the conjunctiva is divided, the ball becomes very loose and may be easily turned out. A common scalpel, rather narrow in the blade, will be found more convenient than any other instrument; and by this the whole operation may be completed. Sometimes the curved scissors will be found useful in clipping off diseased portions adhering to the lining membrane of the orbit, or in removing the lachrymal gland, which ought always to be taken away. In dividing the optic nerve, the surgeon must

be careful not to pull out the eye too forcibly, lest unnecessary pain be created or injury sustained from tearing the nerve. During the dissection blood will flow copiously from the diseased mass or from individual arteries, especially the branches of the ophthalmic; these, however, seldom require the ligature, and the hemorrhage generally stops in a little time after the removal of the tumour, or is readily suppressed by lint, with which the orbit must be filled after the operation. The eyelids should not be touched unless they have suffered from the disease. In favourable cases, granulations sprout rapidly, and in three or four weeks fill up the orbit so completely as not to leave more deformity than usually arises from the loss of an eye under any other circumstances.

See Desault's Works by Smith, vol. 1. p. 87; also Chopart and Desault's Traité des Maladies Chirurgicales et des Operations qui leur conviennent, tom. 1. p. 176—Wardrop on Fungus Hæmatodes, p. 93—Scarpa on the Eye, by Briggs, chap. 21. edit. 2d.—Travers's Synopsis of Diseases of the Eye.



SECTION IV.

Cancer of the Lip.

It is somewhat extraordinary that cancer rarely if ever attacks the upper lip, while the lower lip is frequently subject to it. The disease appears under different forms. In the commencement I have generally observed a small rounded tumour, resembling a shot both in colour and size, seated immediately beneath the skin covering the red part of the lip, and when pressed upon rolling under the finger. The tumour in this state gives no pain, but if frequently handled by the patient, or otherwise irritated, grows rapidly and soon becomes fixed to the surrounding parts. In other cases, a firm and immoveable lump of considerable size, is from the first felt deeply imbedded in the substance of the lip. This approaches the surface slowly, and at last ulcerates and throws out a prolific fungus of a dark red colour, so large as in some instances to envelop the whole mouth. A third variety of the disease is found in the form of a chocolate coloured, warty excrescence; this never attains a large size, but is constantly casting off scabs, the place of which is speedily supplied by others. These tumours are all capable of contaminating by extension the adjoining parts of the face and neck, especially the lymphatic glands, and when this occurs there is very little hope of the patient's recovery.

In *Plate V.* there is an excellent representation of cancer of the lip, accompanied by fungus and an enlargement of the lymphatic glands of the left cheek and angle of the jaw.

The patient resided in Delaware county in this state, and came to Philadelphia about two years since to obtain relief; the disease, however, though not of long standing, was from its advanced state beyond the reach of surgery. Contrary to my advice he placed himself under the care of a quack, who attempted to remove the different tumours by caustic, which so far from proving beneficial, aggravated all the symptoms and speedily produced his death.

Venereal ulceration of the lip and *lupus* have been mistaken for cancer, and treated accordingly. The surgeon, therefore, should be strictly on his guard, and never without full investigation pronounce decisively as to the nature of the complaint, or propose an operation unless well assured of the existence of cancer.

Treatment of Cancer of the Lip.

Although Stark and Langenbeck have praised highly the use of arsenic in cancerous ulcers of the lip, little dependance can be placed upon it or any other remedy except the knife; and this, too, often fails from want of timely application. When determined upon, the operation may be done in the following way.

An assistant holds between the lip and gums of the patient a piece of wood about six inches long, an inch in breadth, and the eighth of an inch in thickness. Upon this the lip is spread out and two incisions made, one on each side of the tumour, quite through a sound part of the lip, in shape of the letter V, and the diseased mass removed. If the tumour has been large and of long stand-

ing, considerable hemorrhage will follow the operation, and it may be necessary to tie several vessels. Frequently, however, the bleeding is effectually suppressed upon drawing together and placing in exact apposition the divided edges of the lip, and there retaining them by the twisted suture or by adhesive straps. In a few days the pins should be removed, when the wound will be found as firmly united as it commonly is after the operation for hare-lip.

Instead of performing the operation in the manner just described, *Richerand** has proposed to remove the whole of the diseased part with a pair of curved scissors, and then to secure the vessels and merely cover the raw surface with a bit of agaric—avoiding altogether the use of pins and ligatures. A case is related by this surgeon in proof of the success of the operation. The whole of the under lip was cut away from one angle of the mouth to the other; yet in the course of a fortnight the chasm was filled up by new matter, and scarcely a vestige of disease or deformity remained. This operation was witnessed by Cloquet, Ribes, Breschet, and Beclard. Mr. Swan,† of England, has repeated this experiment of Richerand, and with a result nearly similar.

* Nouveau procédé pour l'extirpation des cancers aux levres, par M. Richerand—in *Annuaire Medico-chirurgicale*.

† Johnson's *Medico-chirurgical Review*, vol. 3.

See C. Bell's *Operative Surgery*, vol. 2. p. 33—*Dictionnaire des Sciences Medicales*, tom. 28. p. 74—*Alibert's Description des Maladies de la Peau*, observee à l'Hospital Saint Louis, fol. p. 116—*Delpach's Précis Élémentaire des Maladies Réputées Chirurgicales*, tom. 3. p. 549.

SECTION V.

Cancer of the Tongue.

TUMOURS of the tongue, having all the appearances of schirrus, frequently arise from disorder of the digestive organs, or from irritation produced by carious and ragged teeth. Sometimes also the whole tongue becomes enormously enlarged, fills up the mouth and hangs below the chin. Many cases of this kind are recorded by writers, and in particular two very remarkable ones by Percy.* The tongue is likewise studded over, in some instances, with small excrescences, having broad tops and narrow pedicles, resembling a mushroom. At other times deep fissures or irregular cracks occupy the whole surface of the tongue. But these are all different from genuine schirrus or cancerous ulceration, known by the hard, rough, broad-bottomed, wart-like tumour usually situated about the middle of the tongue towards the tip, or by the ragged ill-conditioned sore, covered with fungus and bleeding upon the slightest irritation; both of which are characterized by deep-seated lancinating pain, extending to the throat and base of the skull, and terminate eventually, if not interrupted in their progress, by total annihilation of the organ. Children are occasionally subject to this disease, but it occurs most frequently in persons beyond the middle age.

* See Dictionnaire des Sciences Medicales, tom. xxvii. p. 246

Treatment of Cancer of the Tongue.

There are two operations in use for the removal of the schirrous or cancerous tongue—*excision* and *ligature*. The former was much employed by the older surgeons, but owing to its frequent failure, and the difficulty of arresting the hemorrhage, is now seldom resorted to. The ligature, when applied in the manner first pointed out and performed by Sir Everard Home, is a very effectual remedy, easy of execution and by no means painful.

The surgeon takes a common crooked needle, and having drawn it to the middle of a strong ligature, passes it through the substance of the tongue immediately behind the tumour. The middle of the ligature being cut and the needle removed, there are left hanging two ligatures, one of which is to be drawn forcibly on one side of the tumour, and the other on the opposite side, so as to include a segment of the tongue. A sharp pain follows the tightening of the ligatures, but this soon subsides and the patient afterwards feels little inconvenience except from salivation, which usually ensues in a few hours after the operation. In four or five days the tumour sloughs away and leaves an extensive granulating surface, which fills up with great rapidity. *Arsenic* has been extolled by Lane and others in the removal of cancer of the tongue, but I have never employed it.

See *Home on Cancer*, p. 111 and 207—*C. Bell's Operative Surgery*, vol. 2. p. 29—*Lane's Case of Ill-conditioned Ulcer of the Tongue successfully treated by Arsenic*, in *Medico-Chirurgical Transactions*, vol. 8. p. 201—*Louis, sur les Maladies de la Langue*, in *Memoires de l'Academie de Chirurgie*, octavo edit. tom. 14. p. 364

SECTION VI.

Cancer of the Breast.

THE female mamma is oftener the seat of carcinomatous disease than any other part of the body; though the male breast is rarely affected. Women who have suckled a great many children, and unmarried females, when they arrive at that period of life at which the catamenia cease, are in a peculiar manner liable to suffer. In a few instances I have met with tumours, having all the marks of genuine schirrus, in girls under the age of sixteen.

Generally a small tumour is first perceived in the substance of the breast, not far from the nipple, so loosely connected with the surrounding parts as to move freely under the finger and devoid of pain unless rudely handled, or stretched by the pectoral muscle during the different movements of the arm. For many years the tumour may remain stationary, but in other instances it grows rapidly, and sometimes acquires great bulk. In the worst cases, however, the lump, after having attained a moderate size, becomes shrivelled or contracted, the nipple curls inward, and is soon buried below the surface, the skin assumes a leaden colour, and adheres to the tumour so closely as not to be lifted from it, the whole breast is altered in shape, is irregular and knotted on the surface, and of a stony hardness, attended with deep, stinging or lancinating pain, extending to the arm-pit or into the chest. The lymphatic

glands now suffer, and the whole chain along the armpit, under the clavicle, and up the neck is successively enlarged and indurated. Sometimes the glands of the axilla are not affected, while those near the sternum or in the intercostal spaces are thoroughly contaminated. When the disease has advanced thus far, the skin usually gives way, and is followed by the discharge of a thin, sanious matter. Soon afterwards a fungus shoots forth and occupies the centre of the ulceration, while the edges appear irregular and distorted. Oftentimes, however, the patient is destroyed before the ulcerative stage is established—the disease having extended to the lungs and produced dyspnœa, cough, hectic fever, emaciation and death.

Treatment of Cancer of the Breast.

In the early stages of schirrous breast, or when the tumour is solitary, free from pain, not attached by adhesion to the surrounding parts, and the axillary glands uncontaminated, there is every prospect of success from an operation skillfully performed. The entire removal of the breast, however, in such a case will seldom be necessary, though the remark of Mr. Hunter should never for a moment be forgotten—that the disease often extends much further than the eye can discover. In dissecting out, therefore, an apparently insulated lump from the breast, the surgeon should make it a rule to go beyond the immediate limits of the tumour into the sound parts, taking care at the same time to injure them as little as possible by his fingers, knives or hooks. In most cases a single incision through the skin

two or three inches in length, will afford ample space for the removal of the diseased part.

When the disease has extended so far as to involve the whole breast and adjacent lymphatic glands, a very different kind of operation will be required. The patient should be laid on a strong *narrow* table, previously covered by blankets, and her head, shoulders, and back raised and well supported by pillows. The arm of the affected side should be carried off at right angles from the body to put the pectoral muscle on the stretch, and kept by an assistant in that position until the operation is finished. The surgeon should stand on the opposite side, and commencing his incision in the armpit, below the edge of the pectoral muscle, extend it along on the lower or outerside of the nipple, two inches beyond the base of the breast. A second incision should be commenced at the spot from which the first started and carried downwards, between the nipple and sternum, until the two meet below the breast. An oval space is thus formed, between two curvilinear cuts, which includes the nipple, areola, and perhaps two or three inches of skin in breadth. The integuments are next elevated from the outer edges of the breast, until the greater part of it be fairly exposed; then the breast must be separated from the pectoral muscle beneath, by a regular but careful dissection from below upwards as far as the axilla. Should the lymphatic glands be found free from disease the breast may be removed at once; if, however, the glands are enlarged, or otherwise so contaminated as to require extirpation, then the breast serves as a handle and by its weight drags them down, and the whole diseased mass is removed in a string. During the progress of the dissection the arteries should

be taken up the moment they are cut, otherwise they speedily retract among the cellular membrane and do not afterwards bleed, until the dressings are applied and the patient put to bed. Owing to negligence in this respect, secondary hemorrhage is more frequent after amputation of the breast than any other operation in surgery. Before the edges of the wound are brought together, the whole surface, from which the tumour has been taken, should be accurately examined, and any diseased portions that may have been left carefully removed by the knife or scissors. When the two curvilinear incisions are made in the manner directed, there is no redundant skin, and the edges meet with the utmost nicety; the surgeon has only, therefore, to retain them in contact by a few adhesive straps, supported by lint and a common roller. In several instances in which I have performed the operation, the wound has healed nearly by the first intention.

Under favourable circumstances the operation very frequently succeeds perfectly, and the patient never has the slightest return of the complaint; it must not be concealed, however, that it often recurs very unexpectedly, and advances with wonderful rapidity, and in a way plainly to show—that the knife has not only not eradicated the disease, but hastened its progress. A surgeon, therefore, who values his reputation and the good of his patient, will be very careful not to promise too much, and never to operate unless there is some prospect of success—leaving the hopeless cases to be palliated by diet and medicines, and the unfortunate patients to live as long as their inveterate malady will permit. I say nothing of the use of the actual and potential cauteries, of *artificial* gangrene, as proposed by

Rigal, Garneri, and other French surgeons, of *pressure*, as recommended by Young; because I believe them all to be worse than useless, or only beneficial under circumstances in which the knife would prove less painful and more expeditious.

In conclusion I may state, that there are many indurated lumps of the breast, proceeding from derangement of the digestive functions, from irregularities of the catamenial discharge, and from accumulated milk—easily removed by internal medicines, appropriate diet and local applications.

See *Home on Cancer*—*Adams on Cancerous Breasts*—*Abernethy's Surgical Works*, vol. 2. p. 68, 1819—*Johnson on Cancer*, p. 25 and 116—*C. Bell's Surgical Observations*, vol. 1. p. 1—*Allan's Surgery*, p. 235 and 313—*C. Bell's Operative Surgery*, vol. 1. p. 177—*C. Bell on the varieties of Diseases comprehended under the name of Carcinoma mammae*, in *Medico-Chirurgical Transactions*, vol. xii.

SECTION VII.

Cancer of the Uterus.

PROLAPSUS, polypus, and venereal ulcerations of the uterus, often bear so striking a resemblance to cancer as hardly to be distinguished from it. A minute inquiry, however, into the history of the disease and careful manual examination, will enable the surgeon in most instances to decide correctly.

The usual symptoms of cancer of the womb are, pain in coitu, a discharge of acrimonious, offensive, sanious matter, shooting pains at the lower part of the abdomen and throughout the pelvis; but as these are equivocal and common to other uterine and vaginal complaints, other diagnostics must be sought for. When in a schirrous state the neck of the uterus will be found enlarged, unusually heavy, indurated in some parts, softened in others, and placed lower in the vagina than natural. Its orifice also is enlarged and irregular. After ulceration has taken place, the patient complains when the part is touched, the finger is soiled with blood and matter, and the whole diseased surface feels rough and unequal. The vagina too is more or less affected, loses its natural rugose structure, becomes so contracted or filled up by indurated folds that the finger cannot be introduced without great pain, and finally takes on ulceration. which

extends to the external parts of generation and in some instances even to the thighs and abdomen.

When the disease begins within the cavity of the uterus itself, its progress is somewhat different. The neck for a long time remains unaltered, while the body of the womb enlarges in every direction, and soon attains a considerable magnitude. From its cavity is copiously distilled a very fetid, acrid matter, mixed with lumps of putrid sloughs, and quantities of blood. In this wretched condition a few patients have been known to exist upwards of ten or twelve years; but generally the strongest constitutions sink under the repeated hemorrhages and suffering within a much shorter period.

Cancer of the uterus is seldom met with in patients under forty or fifty years of age, and next to cancer of the breast occurs oftener perhaps than any other similar affection. Indeed, the two diseases not unfrequently exist in the same individual simultaneously.

Treatment of Cancer of the Uterus.

Unfortunately the remedies for this disease, when it affects the whole body of the uterus, are palliative only—such as low diet, frequent purging, opium, rest in a horizontal position, astringent injections, repeated and accurate ablation. But that schirrus, when confined to the neck of the uterus, may be successfully removed, is proved beyond

all doubt—by the result of numerous interesting cases, in which the operation of excision has been performed. Professor Osiander, of Gottingen, was the first to conceive and execute so bold a project; and his example has been followed by Dupuytren and other European surgeons. The first operation of the kind was performed by Osiander, in 1801, on a widow whose vagina was filled by a very vascular, fetid fungus from the orifice of the womb, as large as a child's head. By means of Smellie's forceps the fungus was brought down low in the vagina, but being accidentally broken off, a tremendous hemorrhage ensued: undismayed, however, by this event, the operator determined to proceed, and immediately pushed a number of crooked needles armed with strong ligatures through the bottom of the vagina and body of the uterus until they emerged at the inner orifice. These ligatures served to draw down the uterus and retain it in the vagina near the external orifice. The surgeon then introduced a strong bistoury above the schirrous portion and divided the womb completely in a horizontal direction. The hemorrhage for an instant was violent, but speedily suppressed by a sponge saturated with styptics, and the patient recovered in three or four weeks. Osiander afterwards performed eight similar operations upon different patients, all of whom recovered without the slightest difficulty. Dupuytren also has performed the operation eight times; but instead of employing the ligatures and bistoury recommended by Osiander, he drew down the uterus with forceps, and divided it above the schirrous part by curved knives and scissors. One of the patients upon whom Dupuytren operated had a return of the disease, and submitted to a second operation with no better success, until Recamier, a surgeon of the Hotel Dieu, con-

trived a speculum through which caustic was repeatedly introduced, and by it a complete cure was at last effected.

Within the last three or four years this operation for the removal of the *neck* of the uterus has been frequently practised, sometimes successfully, at other times with an unfavourable result. A still bolder project, however, has recently been carried into effect by Professor Langenbeck of Gottingen—the extirpation of the whole uterus, by an operation somewhat resembling the Cæsarian section. This operation was performed on a woman thirty-nine years of age, of delicate constitution, and the mother of ten children.* “The rectum having been previously evacuated by an injection, the patient was placed with the pelvis raised higher than the rest of the body; a catheter was introduced into the bladder, and a sort of speculum into the rectum, both of which were held by an assistant. The operator standing on the left side of the pelvis, made an incision through the *linea alba* from the symphysis pubis to within two inches of the umbilicus, and finally, into the cavity of the belly, cutting through the peritoneum. An assistant then introduced his left hand, and pressed the bowels out of the way, while with his right, he endeavoured to hold the bladder against the symphysis pubis. The operator took hold of the uterus with his left hand, while with the right he introduced a long pair of forceps made for the occasion, and having taken hold with this instrument, he began at the right ovarium, and thence dissected out the *whole*

* Philadelphia Journal of the Medical and Physical Sciences, No. 10, New Series, p. 349.

uterus together with the schirrosities of the vagina, completing the operation in seven minutes. No blood flowed from the vagina, nor was there any prolapsus of the intestines, although the finger could be passed from the cavity of the belly through the vagina. At the suggestion of Professor Mende, the wound was brought together by very long strips of adhesive plaster; a sponge was left in the vagina, a bandage applied to the abdomen, and the patient put to bed. The uterus, especially its right side, was found to be greatly eroded by the cancer; the os uteri destroyed by deep and foul ulcers, and the portion of the vagina removed with the uterus was in like manner diseased. The patient *sunk rapidly* after the operation; the face became more and more collapsed, and the pulse throughout the whole day was very quick and small. She drank chamomile tea to allay her thirst. In the evening cold sweating of the head and chest, and at nine P. M. she took Dover's powders, but obtained no sleep. The sweating and the excruciating pain continued: no urine had then been discharged after the operation. Next morning the patient took two grains of musk, but immediately rejected it, and the vomiting continued more or less during the day, and could in no way be allayed. The pulse could scarcely be counted. The use of the catheter brought away but a small quantity of urine. Finally, the patient *died* at five P. M. Upon *dissection* the peritoneum was found covered with coagulable lymph, which even united the intestines with each other, and could be drawn out into long threads; the bowels were red, inflamed, and inflated, especially the smaller portions. In the cavity of the pelvis *a great quantity of coagulum* was found, especially on the right side. The urinary bladder was *gangrenous* and easily torn, especially at the fun-

dus; but all the schirrous parts were cut out. No marks of disease were found in other organs.”*

* The above account has been transferred to these pages, not for the purpose of commending the operation, which in our opinion would hardly be deemed justifiable in any case, but as a matter of historical record, and as a beacon to the young surgeon, warning him not to pass the boundaries of *good* surgery under the fallacious hope of rising in his profession by *desperate* means.

See *Observations on the Cure of Cancer of the Womb by Excision*, by F. B. Oslander, in *Edinburgh Medical and Surgical Journal*, vol. 12, p. 286—*Dictionnaire des Sciences Medicales*, tom. 3. p. 588 and 600; also tom. 23. article *Hysterotomie*, p. 293; also tom. 31. p. 240.

SECTION VIII.

Cancer of the Rectum.

THIS, like most other cancerous affections, seldom occurs except in persons advanced in life, and is more common among women than men. It commences in the mucous membrane of the gut, which is thickened and indurated, and its surface sometimes covered with rounded or irregular tubercles. The peritoneal and muscular coats are also enlarged and their interstices filled by numerous membranous partitions. At last all traces of the natural structure are lost, and the different coats are converted into a homogeneous substance resembling gristle, which occupies so large a portion of the cavity of the rectum as almost to obliterate the passage. Thus situated the patient makes violent and often ineffectual efforts to expel the fæces, which when they are discharged, are squeezed into a very narrow compass and resemble worms in form. These efforts give rise to pain and inflammation about the rectum and neck of the bladder, and frequently produce suppression of urine and other distressing symptoms. Moreover the incessant irritation kept up within the cavity of the gut hastens the ulcerative process; large quantities of ropy mucus are then discharged, mixed with ichorous, offensive matter, a fungus sprouts from the ulcerated surface and frequently covers the whole verge of the anus. The disease having reached this height must necessarily soon terminate in death, which takes place either from over-distention of the bowels

above the strictured part, or from general irritation and debility.

When examined by *dissection*, all the parts adjoining the rectum are found more or less diseased, and the bladder, gut, and vagina often communicating freely with each other by ulcerated openings.—There are strictures and other diseases of the rectum bearing some similitude to cancer, that will be noticed under a different head.

Treatment of Cancer of the Rectum.

To prevent an entire closure of the rectum and to render the patient's situation as comfortable as possible, is as much as we can accomplish; for, whatever may be said to the contrary, genuine schirrus or cancer of the rectum is absolutely incurable.* By common wax bougies, (or by pieces

* The following case lately reported in the North American Medical and Surgical Journal, No. 5, p. 201, may seem to militate against the position above laid down—that cancer of the rectum should be looked upon as incurable. But we must still reserve the privilege of adhering to our position, until further evidence to the contrary be adduced. In the meantime the reader is furnished with the statement alluded to from which he may draw his own inference. “The operation of *excision of the rectum* was performed on the 15th of February, 1826, at the hospital La Pitié, by Lisfranc. The patient named Poulain, aged forty-five years, was of a good constitution, and in good health, but had suffered from hemorrhoids for fifteen years; for some months previous, severe lancinating and intermittent pains were experienced, especially at stool. M. Lisfranc on examination discovered that a portion of the rectum, occupying about an inch and a half of the mucous membrane

of sponge cut into a proper shape, dipped in melted wax and afterwards rolled with a spatula and polished,) oiled, and introduced into the rectum beyond the contracted portion, and suffered to remain for two or three hours at a time, or longer if they do not excite too much irritation, and worn for several weeks or months, the passage may be so much enlarged as to permit a free discharge of fæces, and thereby relieve the patient from the unpleasant necessity of perpetual straining to procure a stool. The size of the dilating

in height and in circumference, was in a schirrous state, and that the part which was inverted by straining presented eminences resembling the tumours at the verge of the anus. As this induration was attended with lancinating pain, Lisfranc assured the man that an operation was essential. After some ineffectual attempts to invert the diseased surface of the rectum, M. Lisfranc partially succeeded, by inserting into the rectum the index finger of the left hand in a semi-flexed position and by thus drawing down the part while the patient threw the abdominal muscles into action. He now seized with a pair of strong curved scissors, and towards the verge of the rectum, a part of the tumour, which was incised as deeply as possible, without completely detaching this portion. This could now be more easily seized with the fingers, and by its means the whole of the diseased part was withdrawn externally. The operation was continued by incisions in a circular direction, so as to remove at once, (*en masse*,) the affected tissues. On examination, about half of the sphincter ani was found removed. The hemorrhage was abundant, but was arrested by filling the rectum with lint, and making pressure with a T bandage. In a few hours the dressings were forced out by severe bearing down efforts, with a return of the hemorrhage. The tampon was again employed—some fever supervened—and another effort at stool during the night, forced out the lint with coagula of blood. No return of the bleeding, and of course no renewal of the tampon; no bad symptoms supervened; on the third day, a rectum bougie, of large size, was directed to prevent the contraction of the rectum; and on the 12th of April the patient left the hospital perfectly cured."

instruments should be gradually increased in proportion as the passage widens. Conjoined with this local treatment, moderate diet and occasional purgatives will be found extremely serviceable in keeping the bowels regular and in obviating inflammation. After ulceration is established the bougies or tents must be discontinued, as they will only serve to aggravate all the symptoms. To relieve the patient from pain and procure sleep, an opium pill softened and deposited in the rectum by the end of a bougie will be found the most effectual remedy. Copeland recommends in obstinate cases that have long resisted the bougie, a division of the indurated contraction by the bistoury.

See *Desault's Works by Smith*, vol. 1. p. 366—*Home on Cancer*, p. 129—*Monro's Morbid Anatomy of the Human Gullet, Stomach and Intestines*, p. 347—*Baillie's Morbid Anatomy*, p. 173—*Copeland's Observations on the Principal Diseases of the Rectum*—*Sherwin on the Schirro-contracted Rectum*, in *Memoires of the London Medical Society*, vol. 2—*White on the Contracted Intestinum Rectum*—*Howship on the Rectum*

SECTION IX.

Cancer of the Penis.

BOTH the prepuce and glans penis are liable to cancer; fortunately, however, the disease is not very common. Persons troubled with a natural phymosis are most subject to it—owing perhaps to a morbid sensibility of the glans, produced by its confined situation. A tubercle or wart first appears among the glands of the prepuce or on the glans penis itself. Its base is broad and deeply seated, and seems to be a continuation of the substance of the part upon which it is situated, rather than a diseased superstructure. This will distinguish it from the venereal wart, with which it has sometimes been confounded—the latter having a narrow neck or pedicle while the top is expanded. Whether it occupy the prepuce or glans, the cancerous tumour slowly advances, and at last ulcerates and throws out a cauliflower-like fungus. Then there is a plentiful discharge of fetid matter, mixed with blood, and severe pains are felt darting along the penis into the abdomen. In time the spongy and cavernous bodies of the penis are contaminated, the inguinal glands swell as well as those about the rectum, and the patient's constitution is completely ruined. Sometimes the penis sloughs off as high as the pubes, at other times it is gradually destroyed by ulceration. Cancer of the penis is commonly met with amongst old and dissolute subjects who have frequently suffered from venereal attacks; but it may also occur in healthy persons from con-

tusion and other external injury, as proved by Sir Everard Home in his interesting account of the case of *J. Wallace*.

Treatment of Cancer of the Penis.

When the tumour is small, not of long standing, and confined to the prepuce, it may sometimes be dissected out with success. In most instances, however, amputation of the penis is the only resource, and even this does not always answer; in general it may be stated, that an operation is fruitless after contamination of the glands about the groin and root of the penis. Before amputation is decided upon the surgeon must be well assured of its necessity, for it has happened that the glans penis has been found after its removal perfectly free from disease, or only covered by venereal warts. In doubtful cases the prepuce should be slit up previous to amputation.

There are two or three modes of amputating the penis—each very simple. It may be done by a single stroke of the knife; or by two separate cuts, the first through the skin, which is drawn towards the pubes, the second through the body of the penis. The object of this particular mode is to save the skin, as in common amputation of the limbs, to cover the stump; but experience proves that there is always enough, and frequently too much skin, which, by interfering with the stream of urine, or forming a pocket for the lodgement of matter, is attended with serious inconvenience. Both these operations are objectionable upon another ground—the difficulty and sometimes impossibility

of arresting the hemorrhage, especially when amputation is performed near the pubes, from the shrinking of the corpora cavernosa into the perineum—an accident from which more patients than one have lost their lives. On this account I prefer the operation proposed by Schreger, and which may be done in the following manner.

The surgeon takes hold of the penis, and drawing the integuments as much forward as possible, secures them by a tape. An incision is then made through that part of the skin which immediately covers the *dorsal arteries*. These are cut and tied. The next incisions penetrate the corpora cavernosa until the two *arteriæ profundæ* are opened. These being secured in like manner, it only remains to divide the corpus spongiosum urethræ. This must be done gradually, or in such manner as to divide and tie the two *arteriæ cavernosæ* before the penis is entirely separated. The advantages gained by this mode of operating must be very apparent, since the surgeon by preventing the retraction of the penis until the six principal arteries are secured, has the hemorrhage completely under his control.

The sides of the urethra, in some instances, unite permanently after amputation of the penis. Cases of the kind are recorded by Le Dran, Hey, Desault and Bertrandi. To prevent such an accident, which would necessarily produce suppression of urine and other ill effects, many writers recommend the introduction of a metallic cannula or gum elastic catheter. There is reason to believe, however, that the occasional use of a probe or small bougie would answer every purpose, without subjecting the patient to the pain and inconvenience of wearing an instrument constantly.

The surgeon should make it a rule in amputating the penis, never to remove more than is absolutely necessary to destroy the disease; for it is now well ascertained, that the glans penis may be lost without annihilation of the procreative powers.

See *Hey's Practical Observations in Surgery*, p. 461. edit 3d—*S. Cooper's First Lines of the Practice of Surgery*, vol. 2. p. 204. edit. 4th—*C. Bell's Operative Surgery*, vol. 1. p. 130—*Home on Cancer*, p. 1—*Pearson on Cancerous Complaints*—*Roux's Narrative of a Journey to London in 1814*, p. 261—*Wadd's Cases of Diseases of the Prepuce and Scrotum*, p. 17. plate 7.

SECTION X.

Cancer of the Testicle.

UNDER the name of *sarcocoele*, several diseases of the testicle have been comprehended, very different in their nature. These will be considered at a future period under separate heads. The present remarks will apply exclusively to that condition of the testicle which bears a striking similitude to the schirrous and cancerous structure met with in other parts of the body.

The external characters are a stony hardness of the body of the testicle and epididymis, accompanied by enlargement, great inequality and uncommon weight—the tumour feeling, when handled, like a lump of lead. In the progress of the disease, the cord and inguinal glands become contaminated and enlarged, and if the patient survives sufficiently long the scrotum sometimes inflames and ulcerates, and throws out the bleeding fungus peculiar to cancer. The symptoms are deep-seated, lancinating and incessant pain, extending up the cord, along the loins, and down the thighs. The true malignant schirrus of the testicle seldom attains a very large size. I have met with two or three instances, however, where the tumour became as large as a cocoa-nut and was surrounded by water, constituting the disease usually called hydro-sarcocoele. From forty to sixty years of age is the period at which the schirrous testicle generally occurs. When dissected, the morbid structure

is found to correspond exactly with that of the cancerous breast.

The *cancer scroti*, chimney-sweeper's cancer or soot-wart, a disease endemial in England, and in its advanced stage resembling in many respects common cancer of the testicle, has never been seen that I know of in America. This may perhaps be owing to the general use of wood instead of coal, or to the circumstance of negroes alone being employed in the sweeping of chimneys.

Treatment of Cancer of the Testicle.

Although the schirrous or cancerous testicle may remain for a long time dormant, in the end it is sure to display its true character, and to prove fatal unless arrested by an operation. Before the surgeon ventures, however, to decide upon so important a measure, he must be well assured not only of its necessity, but of its probable success. There are two points then deserving attention—not to confound the schirrous testicle with other tumours bearing a resemblance to it, such as fungus hæmatodes, venereal sarcocoele, scrofulous enlargement of the testicle; and again—never to operate after the cord has become extensively diseased and the glands of the groin or those within the abdomen contaminated.

The extirpation of the testicle is one of the most simple but severe operations in surgery. It is performed in the following manner. The patient is placed on the edge of a

table and the thighs kept asunder, while the surgeon, seated before him, grasps the testicle in one hand and with the other makes an incision through the skin, commencing above the abdominal ring and extending to the base of the scrotum. Some of the branches of the external pudic now spring and must be secured by ligature. A second incision lays bare the cord and freely exposes the tunica vaginalis. With the handle of the knife, and by slight dissection, the cord is gently separated from the loose cellular membrane around, to an extent sufficient to admit the finger beneath it, and carefully examined lest a small hernia or piece of omentum should be concealed within the condensed cellular membrane attached to its sheath. The next step is to divide the cord, not by a single stroke, but by successive touches with the knife, picking out the arteries as they spring with the point of the tenaculum or forceps, and tying each separately with a very fine ligature. The whole being secured and all danger of hemorrhage at an end, the cord is cut across, and is immediately drawn up to the ring by the action of the cremaster muscle. It only remains to detach the testicle from the scrotum and loose cellular membrane which surrounds it. This is easily accomplished and without much pain, as the sensibility of the testicle is very much blunted after the separation of the cord. The operation is finished by drawing together the edges of the scrotum with three or four stitches, covering the part with lint and supporting the whole by a bag truss or handkerchief.

The arteries of the cord are sometimes so much enlarged as to bleed profusely if not well secured, and several patients have lost their lives, either from negligence of the

surgeon or from the cord slipping within the ring before the vessels were tied. On this account, a general practice formerly prevailed of including the whole cord in a single ligature. But the great pain and violent symptoms, arising from compression of the vas deferens and numerous nerves of the cord, which sometimes followed, rendered the operation extremely objectionable, and induced Sir Everard Home to attempt an improvement on it, by excluding the vas deferens and encircling the remainder of the cord by passing a needle, armed with two ligatures, through its centre, and tying one on each side of it—thereby making the compression more effectual, and obviating all risk of the ligatures slipping. Even with this modification, however, the plan is still reprehensible, since it exposes the patient to unnecessary suffering without adequate advantage; for it is now acknowledged, that it is seldom necessary to secure more than two arteries—the spermatic and that of the vas deferens. These, it is true, are sometimes greatly enlarged, but nevertheless perfectly under command of the surgeon, when he follows the course I have pointed out. At any rate, it is very easy to include the whole cord in a ligature, after having failed to secure the individual vessels. The arteries of the scrotum are often of large size, and when cut shrink among the cellular membrane, and do not bleed until the dressings are applied and the general circulation is completely restored. The surgeon should be aware of this, and endeavour to tie them before the operation is finished. When the schirrous testicle attains an unusual magnitude there will be a redundancy of skin, unless two curvilinear incisions are made, (instead of a single cut,) in the manner formerly directed for cancerous breast.

Weinhold has proposed, in cases of diseased testis, to cut across the cord merely, and leave the tumour in the scrotum to be diminished or removed by absorption; and the practice has received the sanction of Maunoir of Geneva. The idea is extremely ingenious, but experience must determine the propriety of the measure.

Consult *Home on Cancer*, p. 116 and 231—*C. Bell's Operative Surgery*, vol. 1. p. 222—*Cooper's First Lines*, vol. 2. p. 129 and 135—*Desault's Works*, vol. 1. p. 390—*Ramsden's Practical Observations on Scle-rocele*—*Nouvelle Methode de traiter le Sarcocèle, sans avoir recours à l'Ex-tirpation du Testicule*, par C. Th. Maunoir, 8vo. 1820.

SECTION XI.

Fungus Hæmatodes.

MR. JOHN BURNS, of Glasgow, was the first to give any regular account of this very formidable and destructive disease. His observations were soon followed by those of Hey and Abernethy, both of whom described the affection under a different appellation. The term fungus hæmatodes, invented by Hey, has been considered less objectionable than any other, and therefore retained by most writers.

This disease may occur in almost any part of the body, but the extremities are particularly liable to it. Though not very common in America, it occurs often enough to deserve the attention of the surgeon. When it occupies any of the external parts it is characterized by the following appearances. In the incipient stage a small tumour is perceived, almost devoid of sensation, smooth on the surface, moveable under the integuments and elastic to the touch. This may remain stationary for years, without giving the patient the slightest uneasiness, until a blow or strain, or some accidental injury causes it to inflame, and then it increases with wonderful rapidity, while the skin loses its natural colour, and becomes mottled or red in some parts and purple in others. In a few weeks the tumour attains a considerable bulk, and in proportion to its growth is rendered protuberant or lobulated; at the same time the veins

on its surface are greatly enlarged and very conspicuous, and at no very distant period ulceration takes place in one or more spots, from which a fungus sprouts with the utmost luxuriance. This fungus is of a dark red colour, extremely vascular and commonly contracted about the neck, while the top is expanded and irregular. The disease having advanced thus far soon contaminates the contiguous lymphatic glands, which are converted into a substance exactly resembling that of the original tumour. In the mean time the patient's health gradually declines, the countenance assumes a yellow cadaverous hue, the whole constitution is undermined by hectic, and death speedily follows.

The morbid mass, when examined by *dissection*, exhibits appearances altogether distinct from those met with in any other disease. A very thin and undefined capsule invests the whole tumour, and, within this, lobes separated from each other by membranous partitions of soft pulpy matter resembling *brain* in consistence and colour, compose the greater portion of the distempered fabric. In the midst of this medullary-like matter are often found cells filled with clotted blood; at other times small cysts are met with containing a thin, sanious and fetid serum. So extensively involved are all the textures in the neighbourhood of the tumour, that the muscles are often annihilated, or their structure so subverted as scarcely to be recognised, and the arteries, veins, nerves and cellular membrane all blended together in one confused mass. When the lymphatic glands and those in the course of the circulation are examined, they are found equally diseased, often throughout the

body. The same may frequently be said of the liver, lungs, kidneys, and brain, all of which exhibit proofs of universal contamination.

Fungus hæmatodes has been confounded with aneurisms, cancerous tumours and other diseases; and I have known such mistakes attended with very serious consequences. From cancer, to which it bears a greater resemblance than any other affection, it differs in the following respects. The tumour of *fungus hæmatodes* is large, soft and elastic, and to the touch imparts so deceptive a sensation of fluctuation, that a lancet has often been pushed into it—under an idea that it contained purulent matter. The schirrous or cancerous tumour, on the contrary, is hard, solid and incompressible, and in the advanced stages frequently shrivelled or contracted. *Fungus hæmatodes*, when dissected, is found to consist, chiefly of a soft, pulpy, tenacious medullary-like matter. Cancer, when examined in the same way, exhibits a hard, fibrous substance, resembling cartilage, which occupies the centre of the tumour as a nucleus, and from this centre white narrow bands proceed irregularly towards the circumference. *Fungus hæmatodes* is almost invariably met with amongst children and young persons—cancer may be said to be almost peculiar to the old. *Fungus hæmatodes* occurs in organs which cancer never attacks—such as the brain, liver, kidneys, and spleen. Other distinctions might be pointed out, but these are sufficient to designate the complaint.

The *eye*, according to late European writers on that organ, is particularly subject to *fungus hæmatodes*. In this country I have never seen more than three or four cases

of the disease; these differed materially from cancer of the eye. The retina and optic nerve are the textures in which fungus hæmatodes usually commences, and the first symptom is an obscurity of vision, occasioned by a small shining tumour which occupies the bottom of the posterior chamber and may be distinctly seen by looking into the pupil. This tumour slowly increases, advances into the vitreous humour and finally reaches the iris, behind which it appears so much like cataract as to be with difficulty distinguished from that disease. Soon after the whole eyeball loses its spherical form, becomes irregular or protuberant, the cornea ulcerates, and a large, soft, dark red or purple fungus is sent forth. When the diseased mass is removed by an operation and examined, it is found to consist of medullary-like matter throughout, and so exactly resembling in other respects the structure of fungus hæmatodes as to render further description unnecessary. The circumstance of fungus hæmatodes commencing generally at the bottom of the eye, its attacking almost invariably children and young subjects, and the peculiar structure of the morbid mass, are sufficient proofs that the disease is distinct from cancer, which usually occurs in old people, originates in the anterior parts of the eye, and when dissected presents appearances very different from those just pointed out.

The *testicle*, when affected by fungus hæmatodes, sometimes resembles hydrocele so closely, that the most intelligent and experienced surgeon is unable to decide between the two diseases. This deception, however, cannot endure a very long time; for after the fungus hæmatodes tumour attains a moderate bulk, the constitution shows evident marks of contamination, and the lymphatic glands of the

thigh and groin are sensibly enlarged. It is hardly possible to confound the schirrous testicle with fungus hæmatodes of the same organ. The one is very firm in its texture and extremely heavy—the other soft, fluctuating, pulpy, and generally free from pain. When *dissected*, the structure of fungus hæmatodes of the testicle is better marked perhaps, and affords more striking evidence of the genuine disease than is met with in any other part of the body.

Besides the testicle, fungus hæmatodes occurs primarily in the thyroid gland, lungs, liver, spleen, kidney, female breast, uterus, ovarium, and some other parts, and in every instance exhibits characters too distinct and regular to leave any doubt of its being unallied to cancer, or any other affection with which we are acquainted—notwithstanding the assertions of some of the French surgeons to the contrary.

The drawing in *Plate VI.* is introduced to illustrate the common appearance of fungus hæmatodes when seated on the extremities. The disease occurred in a boy nine years old, commenced about the middle, but finally involved the whole thigh, and in a few months proved fatal.

Plate VII. represents a fungus hæmatodes of enormous dimensions, seated upon the shoulder and arm. The woman was sixteen years old when the tumour was first perceived—about the size of a marble. During four years it gradually increased, and a short time before her death threw out a most prolific fungus, which sloughed away a few hours before the drawing was made. and left the large

ulcerated cavity seen on its surface. The tumour remained for many months free from fungus and ulceration, until an opening was made with a lancet by an ignorant empiric, who supposed the swelling to be an abscess. Dissection, however, proved it to be fungus hæmatodes, filled with a substance resembling brain, but much firmer in texture than usual. The surface of the tumour, as the drawing shows, was uncommonly smooth and free from protuberances, and in this respect differed from the disease usually met with.

Treatment of Fungus Hæmatodes.

As regards the treatment of fungus hæmatodes very little satisfaction can be afforded; for in the whole range of surgical disease there is no affection so truly alarming or so intractable in its nature. In vain are internal medicines and local applications prescribed; they do not even palliate the complaint. Even extirpation of the tumour, and that too in its very incipency, answers so little purpose, that there is hardly a case on record where the operation has succeeded. One of the most extraordinary and interesting cases perhaps ever related, in which the fairest trial was given, without effect, to repeated and most extensive operations, is detailed by Mr. Allan.* The patient suffered during thirteen years from a very large tumour which occupied the left hip. When it attained the size of a child's head it was dissected out by Mr. Newbigging, of Edin-

* See Allan's Surgery, vol. i. p. 264.

burgh, apparently with success; for the wound healed and the patient felt perfectly well. At the end of nine months, however, it grew again, and in seventeen months from the first operation, a second was performed by Mr. Russel, upon a tumour as large as the two fists. The wound soon healed, but in nine months following the tumour recurred, and soon equalled in size a very large mamma. A third operation was now undertaken by Mr. Allan, and so extensive was the dissection, that the wound was as large as the crown of a hat. In a few weeks it healed perfectly; but the tumour appeared again in seven months. The late Mr. John Bell was then consulted, and performed a fourth operation upon it—the tumour at the time being as large as the head of a child eight years old. Several months after, the diseased mass was reproduced and from the surface a fungus sprouted, in shape and size resembling a large cauliflower. This, Mr. Allan removed by ligature, and the patient for the time was relieved. His constitution, however, was completely ruined, and although he lived for several months afterwards, he died at last, quite exhausted by the long continued discharge from the fungus—nearly eight years having elapsed from the time of the first operation. This case plainly shows how little we are to expect from extirpation; and it only remains to say, that nothing less than amputation of a limb, when the disease happens to be so situated as to admit of it, will afford any chance whatever of saving the patient's life, and that even this resource is frequently unavailing—owing to the stump assuming the same morbid action, or to thorough contamination of the internal organs.



Figure 1. Nature by W. Gibson.

Engraved by C. Tiebout.

See *Pott's Works*, vol. 3. p. 223—*Burns's Dissertations on Inflammation*, article Spongoid Inflammation, vol. 2. p. 132—*Hey's Practical Observations in Surgery*, p. 239. edit. 3d—*Abernethy's Surgical Works*, vol. 2. p. 56, article Medullary Sarcoma—*Wardrop's Observations on Fungus Hæmatodes or Soft Cancer*, in several of the most important Organs of the Human Body—*Langstaff's Cases of Fungus Hæmatodes*, in vol. 8. part. 1. of *Medico-Chirurgical Transactions*, p. 272—*Langstaff's Cases of Fungus Hæmatodes, Cancer, and Tuberculated Sarcoma*, in vol. 9. part 2. of *Medico-Chirurgical Transactions*—*Roux's Journey to London*, p. 189—*Boyer's Treatise on Surgical Diseases*, by Stevens, vol. 1. p. 318, article Bloody Fungus—*Scarpa on the Eye*, by Briggs, edit. 2d—*Stevens's Cases of Fungus Hæmatodes of the Eye*, in the *New York Medical Register*, p. 117—*C. Bell's Surgical Observations*, article Soft Cancer, p. 365—*Delpech's Précis Élémentaire des Maladies Chirurgicales*, tom. 3. p. 480—*Baillie's Morbid Anatomy*—*Travers' Synopsis of Diseases of the Eye*.

SECTION XII.

Gonorrhœa.

GONORRHŒA, or at least a purulent discharge from the urethra, may be considered a disease of very ancient date; for we find it expressly enjoined in the Levitical law,* that "*when any man hath a running issue out of his flesh,*" or a *γονορρυεσ*, as the Septuagint terms it, he must be secluded, or restrained from sexual intercourse, in order to prevent contamination. It is still a matter of doubt, however, whether the disease now termed *virulent* gonorrhœa, was implied in the passage referred to, or merely that discharge from the urethra which often takes place without the application of any morbid poison, arises from irritation, severe exercise, fluor albus, immoderate use of the genital organs, and known to surgeons under the name of *simple* gonorrhœa. But these are matters of very little importance at the present day except as regards the question—whether gonorrhœa and syphilis be of the same or of a different nature.

The symptoms of the *virulent* gonorrhœa are a slight titillation or uneasiness of the glans penis, a pouting or tumidity of the lips of the urethra, more or less redness or inflammation about the prepuce and glans, together with a

* See Patrick's Commentary on the third book of Moses, chap. xv. p. 245—also Clark's Commentary on the Bible, xvth chapter of Leviticus.

general fulness of the whole penis. These are soon followed by a discharge from the urethra, of a thin whitish fluid, at first resembling common mucus, but speedily changing into a thick, tenacious, purulent matter, of yellow colour and peculiar smell. Considerable pain is now felt along the urethra and perineum, the urine is discharged in a thin, wire-like or forked stream, accompanied with a burning heat or severe scalding. By this time the inflammation attains a considerable height, the glans penis becomes swollen, tense, of a bright red colour, and its surface has a peculiar shining aspect, as if glazed or highly polished. The pain and *ardor urinæ* are increased in proportion as the inflammation rises, and the colour of the discharge, from the same cause, changes from a deep yellow to a greenish tint. Oftentimes the glans penis is excoriated, and there is a copious discharge not only from the urethra but from the whole internal surface of the prepuce. These are the ordinary symptoms of the complaint; they are liable, however, to be more or less modified by peculiarities of constitution and by other causes; hence we find some patients to suffer immensely, whilst others experience very little inconvenience during the whole course of the disease.

A very painful affection frequently accompanies gonorrhœa, and is known by the name of *chordee*. This consists of an involuntary erection of the penis, which generally occurs at night, while the patient is warm in bed, and is so severe as to prevent sleep. It arises during the height of the inflammation, and is always one of the most troublesome symptoms that the patient has to contend with. The penis is drawn downwards or bent into a semicircular shape; and if the inflammation runs high, and the erections con-

tinue to recur repeatedly, coagulable lymph is effused into the cells of the corpus spongiosum, the sides of which are agglutinated in such a way as to prevent the future distention of the cells, to an extent equal to that of the corpora cavernosa, and the penis ever afterwards, during erection remains crooked and deformed.

There are other symptoms also which occasionally take place during the violence of the inflammation. These are a frequent and irresistible inclination to pass urine, owing to the inflammation having extended along the whole course of the urethra as far as the bladder. So severe is the pain in some instances from this cause, that the patient is afraid or unable to evacuate a single drop of urine, and a total suppression ensues, which adds greatly to his distress. From the bladder the irritation extends to the rectum and adjoining parts; a tenesmus takes place and becomes exceedingly severe and troublesome, there is an acute lancinating pain shooting from the neck of the bladder above the pubis; the small glands along the tract of the urethra, whose ducts open into that passage, are enlarged, and sometimes suppurate and discharge externally through the skin. The glands of the groin likewise are frequently affected in a similar manner, and the vas deferens, testicles, ureters, and kidneys often sympathise with the inflamed urethra and bladder.

But of the sympathetic affection of these different organs, that of the testicle, known by the name of *hernia humoralis*, is the most common. It usually occurs about the decline of gonorrhœa, and frequently after the inflammation and discharge have entirely ceased. At other times

it takes place suddenly during the height of the inflammation, and then the discharge as suddenly ceases, and the pain leaves the urethra and fixes upon one or both testicles, which "seem," as Mr. Hunter has expressed it, "in many cases rather to be acting for the urethra than for themselves, an idea applicable to all sympathies." Generally, however, only one testicle is affected at a time, though the transition of the disease from one to the other is often extremely rapid. In either case, there is first a soft, diffused swelling of the testicle, which soon becomes hard and very painful. The hardness is most remarkable at the epididymis, and the pain from that part extending up the cord and along the loins, frequently so acute as to induce rigors, fever, sickness of stomach and great derangement of the digestive organs. These symptoms may continue for a considerable time, and give rise to permanent enlargement of the testicle, or they may disappear in a few hours or days, as suddenly as they were induced, without the gland having sustained any injury. In general the swelling diminishes in proportion as the discharge from the urethra is increased, and when it is fully established entirely disappears.

Women are not so liable to gonorrhœa as men, nor do they suffer as much from it—owing to the insensibility of the vagina compared with that of the urethra. It is not easy, indeed, in every instance to determine the existence of the disease in a female, so slight is the pain and so equivocal the discharge; though I have met with several cases, in which the inflammation ran so high and produced such intolerable anguish, that the patients were unable to leave their beds. Gonorrhœa has often been confounded with flour albus; but close attention to the symptoms pecu-

liar to each complaint will be sufficient, in general, to distinguish them.

Most violent inflammation, and even total extinction of sight, has followed the accidental application of gonorrhœal matter to the eye. I have met with several cases of this description, two or three of which originated from the patient's washing the eye with their own urine, (while they laboured under gonorrhœa,) in order to relieve a common inflammation of that organ—a practice exceedingly frequent among the vulgar. The disease will be further noticed under the head of *ophthalmia*.

Gonorrhœa may terminate spontaneously or “wear itself out,” or else degenerate into a disease commonly known by the name of *gleet*, which is characterized by the discharge from the urethra of a white, limpid mucus, destitute of virus, and proceeds from a relaxation or debility of the lining membrane of the passage—a consequence very apt to follow inflammation of all mucous membranes. Such at least is the account usually given of the disease by writers, though I very much question the accuracy of their statements, and am inclined to believe that the discharge denominated gleet, in most instances, is in truth a *chronic* gonorrhœa, and as such capable of communicating infection. There is also a mucous discharge from the urethra attending other diseases of that passage, particularly *stricture*, which I am persuaded is often considered a gleet, and treated accordingly; but this is certainly not infectious, and differs widely from the discharge which follows a gonorrhœa.

Treatment of Gonorrhœa.

The remedies for gonorrhœa are *constitutional* and *local*. The former are chiefly indicated in the commencement or during the height of the inflammation, while the latter may be employed at any stage of the disorder. In severe cases and in plethoric habits, blood-letting, purgatives and low diet will generally all prove necessary. Considerable experience, however, in the treatment of this disease has taught me, that steady purging is more to be relied on in lessening the inflammation and in removing pain, than even copious depletion by the lancet. Repeated and small doses of jalap or rhubarb, combined with the super-tartrate of potash, I have found extremely useful; indeed in many cases I have prescribed the cremor tartar alone in such quantities as to produce both purgative and diuretic effects, and continued it steadily for two or three weeks with the greatest advantage, after most other remedies had failed. Besides purgatives, stimulating diuretics often prove highly serviceable, both in the inflammatory and chronic stages of gonorrhœa. The *balsam copaivæ* is more decidedly beneficial than any other remedy of the class. It had long been used in the advanced stages of gonorrhœa, but Dr. Chapman was the first to prescribe it during the height of the inflammation or from the very commencement of the attack. So far back as the year 1806, I well remember to have heard him express his decided conviction of the superior efficacy of the remedy when thus administered. Dr. Armstong, in his late work on scarlet fever, speaks of the practice as novel, and seems to attri-

bute its introduction to a Dr. Dawson, who, it is stated, had prescribed the medicine with great success for more than twelve years, in the very commencement of virulent gonorrhœa. Dr. Chapman's claim to priority, however, is most unquestionable. For many years past I have employed the remedy very extensively, both in the recent and advanced stages of the complaint, sometimes with most decided effect, but in other instances without the slightest alleviation of the symptoms. This may have proceeded from the bad quality of the medicine, which, it is well known, is often ruined by adulteration. The *cubebs*, another stimulating diuretic, formerly much employed in the treatment of gonorrhœa, has recently been highly extolled as possessing very superior powers. From numerous trials, however, I am inclined to believe that its virtues have been greatly overrated. Within the last few months tincture of *iodine* has been extolled by Richond* as a most valuable remedy in gonorrhœa, particularly when employed after full effect has been derived from low diet, leeches, &c. *Demulcents*, by blunting the acrimony of the urethral discharge and by exciting the action of the kidneys, are always used with advantage in gonorrhœa, and should never be neglected.

The *local* remedies for gonorrhœa may be applied either to the penis itself or to the urethra. For several years past I have been in the habit of prescribing a warm bread and milk poultice in the very commencement of the disease, and always with the utmost advantage. To derive full be-

* Annales de la Médecine Physiologique, 1827.

nefit from the application, the prepuce should be retracted and the glans penis completely buried in the poultice, which should be as warm as the patient can bear it, and renewed as often as it becomes cold and stiff. By persevering in the use of the poultice for a few days all the symptoms are mitigated, and the way paved for mild and warm injections—such as rose water, thin solutions of gum arabic, flax seed or opium, weak decoctions of oak bark, &c. These check the discharge gradually, and often effect a cure. As the ardor urinæ and discharge diminish, more astringent injections may become necessary. Those commonly employed are solutions of the acetate of lead, of white, green and blue vitriol, alum, borax, &c. They are all inferior, however, to a solution of the *nitrate of silver*, a medicine that has been strenuously commended lately in the cure of every stage of gonorrhœa, but which I have used extensively for the last fifteen years and with the greatest success. By commencing with three grains of the caustic to an ounce of water, and gradually increasing the strength of the solution until the patient feels it sensibly, a cure may be produced in a very short time. Some surgeons commence with twenty grains to the ounce; but great irritation, suppression of the discharge, and swelling of the testicle have followed the practice. In some instances I have derived considerable advantage from the caustic, when mixed with oil and introduced into the urethra on a small bougie. The *nitric acid*, properly diluted, was a favourite remedy with Vigaroux, an eminent French surgeon. Dr. Physick has also employed it very successfully in several obstinate cases of gonorrhœa. The *vinous* tincture of opium I have often used with great advantage in the early stages of go-

norrhœa. At first it should be considerably diluted, but afterwards may be used pure.*

As *chordee* is one of the most troublesome attendants on gonorrhœa, it should be checked as soon as possible. Camphor, combined with opium and given in large doses, will be found singularly efficacious in arresting its progress.

Hernia humoralis being generally dependant upon suppression of the urethral discharge, induced by irregulari-

* Any of the following formulæ of injections may be employed in the early or inflammatory stages of gonorrhœa.

R Liq. plumb. acetat. gutt. vi
Aquæ distillatæ, ℥iv
M.

R Liq. plumb. acet. gutt. vi
Opil. purif. ℥i
Aquæ distillatæ, ℥vi
M.

R Zinci acetatis, grs. x
Aquæ distillatæ, ℥vi
M.

R Zinci sulphatis, grs. iv
Aquæ distillatæ, ℥v
M.

R Acidi muriatici, gutt. x
Aquæ distillatæ, ℥v
M.

R Acidi nitrici, gutt. xij
Aquæ distillatæ, ℥vi
M.

R Vini opii, ℥i
Aquæ distillatæ, ℥iij
M.

R Balsami copaibæ, ℥i
Mucilaginis acaciæ, ℥ss
Aquæ rosæ, ℥vi
M.

ties, debauch, the use of strong injections, &c., the first object of the surgeon should be to re-establish the running. This may often be accomplished by warm poultices, large enough to cover the whole penis and testicles, or by the introduction of a bougie into the urethra. With this treatment, general and local blood-letting should be combined together with purgatives, while the patient is confined to the horizontal posture, and the testicles supported by a bag truss or handkerchief.

For the relief of the *irritable bladder* and *rectum*, I know of no remedies so effectual as the warm bath, opiate glysters, and warm poultices or fomentations to the perinæum.

Gleet, when it really proceeds from gonorrhœa, and is not connected with stricture of the urethra, will generally be benefited or cured by stimulating injections,* blisters to

* The best injections for gleet are those composed of the sulphate or acetate of copper, of the supersulphate of alum, of the oxymuriate of mercury, of the ammoniaret of copper, &c. Any of the following formulæ will frequently answer, and if one fail another should be tried.

R Cupri sulphatis, grs. ij
Aquæ distillatæ, ℥viij

M.

R Æruginis præparatæ, grs. x
Olei amygdalæ, ℥iv

M.

R Aluminis supersulphatis, grs. iv
Aquæ distillatæ, ℥iv

M.

R Liquoris cupri ammoniati, gutt. xx
Aquæ rosæ, ℥iv

M.

R Liquoris hydrarg. oxymuriatis, gutt. iij
Aquæ distillatæ, ℥iv

M.

the perinæum, the internal use of cantharides, the muriated tincture of iron, tincture of cubebs, and by the introduction of plain or medicated bougies.

The remedies for gonorrhœa in *women* do not differ from those required for men, except in being used stronger or in larger doses.

Consult *Hunter's Treatise on the Venereal Disease*, by Adams, p. 58. London, 1810—*B. Bell's Treatise on Gonorrhœa Virulenta and Lues Venerea*—*Swediaur's Practical Observations on Venereal Complaints*—*Adams on Morbid Poisons*, edit. 2d—*Sawrey's Inquiry into some of the effects of the Venereal Poison*, 1802—*Carmichael's Essays on the Venereal Diseases which have been confounded with Syphilis*—*Carmichael's Observations on the Symptoms and Specific Distinctions of Venereal Diseases*—*Jeffrey's Practical Observations on Cubebs*. London, 1821—*Johnston and Bartlett's Report of Cases of Gonorrhœa*, in *Edinburgh Medical and Surgical Journal*, vol. 14—*Roberton's Remarks on the Internal Use of Tincture of Cantharides in Gleet, &c.* in *Edinburgh Medical and Surgical Journal*, vol. 2. p. 134.

SECTION XIV.

Syphilis.

It may perhaps with truth be said, that previous to the time of the illustrious Hunter no very accurate views were entertained respecting the nature of syphilis or lues venerea. This great pathologist, aware of the confusion and obscurity in which the disease had been involved from loose and fallacious descriptions of its symptoms, and of the ill consequences which often resulted from confounding affections in reality very opposite to each other, endeavoured to establish the true character of the venereal ulcer, as contradistinguished from other ulcerations to which the genitals had been subject from time immemorial. The fidelity of his details and accuracy of his distinctions have been amply acknowledged by most subsequent writers; within a few years, however, new facts have accumulated, or at least forms of disease apparently new have been brought forward, which, if admitted to be strictly venereal, are calculated to subvert all former distinctions, and in defiance of precepts founded upon data supposed to be firmly established, are likely to involve in utter confusion and perplexity all knowledge of the disease or of the method of cure. But fortunately, many of Mr. Hunter's facts, and the inferences which he drew from them, are confirmed and supported, unintentionally, by the advocates of the new-fangled doctrines and the promulgators of new diseases. Most of these diseases, it is well known, have been described with great

precision and accuracy by Celsus, in his chapter "*de ob-scænarum partium vitiis*," upwards of twelve centuries ago, and long before syphilis was known to exist. That the venereal disease appears now under the exact forms described by Mr. Hunter, I shall ever be firmly persuaded, so long as I observe the symptoms and appearances daily met with in patients, to correspond with his descriptions. What changes the disease may have undergone in Europe, I cannot say; but in this country, so far as numerous opportunities of treating it can be depended on, I have no hesitation to declare, that the old fashioned chancre, so minutely and accurately portrayed by Hunter, is exceedingly common, and may be seen at any time in full luxuriancy. These remarks are not made to invalidate the statements of the respectable European and American writers, who contend for the existence of a plurality of venereal poisons, but merely to express a belief, that diseases resembling syphilis, and often confounded with it, are by no means unfrequent; and that genuine syphilis, as it was understood by Mr. Hunter, is still known, however modified occasionally by peculiarities of constitution, climate, &c. Under this impression, I shall proceed to treat of the primary symptoms of syphilis, commencing with chancre.

Chancre, or the true syphilitic sore, usually begins with a slight redness or inflammation on some part of the genital organs, attended with pruritus or itching. This itching is soon converted into pain, and a pimple is in a short time formed, filled with pus, which upon bursting leaves an excavated ulcer of a circular shape, with hard and abrupt edges, and a surface coated with a grey tenacious matter. The base of the ulcer is thickened and indurated, and the

parts surrounding it for some distance converted into a tumour so distinct and circumscribed, that it may be elevated by the fingers, and feels like a hard and moveable body beneath the skin. This description will particularly apply to chancre when seated on the glans penis; some variation is observable, however, when the prepuce or frænum is affected. In such cases the inflammation is generally higher, the pain more considerable, and, instead of a regular pimple filled with matter, the chancre often follows directly a slight excoriation or abrasion of surface. When seated on the common skin of the penis or scrotum, the matter discharged from the sore soon dries and forms a scab, which quickly drops off and is succeeded by another of larger size. Wherever situated, chancre commonly preserves certain general features that serve to distinguish it from common sores, the edges of which are usually smooth and shelving—while those of chancre are jagged and vertical. But, perhaps, the most characteristic sign of genuine primary syphilitic ulceration is the *indurated* base; and so long as this continues, even although the sore may have healed, little doubt will remain of the presence of disease.

Chancres may occupy any part of the surface of the body, but they occur more readily on mucous membrane than on the common skin. When situated on the penis, they are usually met with along the frænum, behind the corona glandis, in the mouth of the urethra, or on the internal surface of the prepuce. Among females, the parts commonly attacked are the labia, the nymphæ, and the entrance of the vagina; though not unfrequently very large and virulent chancres appear on the perinæum, the outside of the labia, near the anus, or on the hip. Sometimes the lips, eyelids, or edges

of the nostrils are covered with chancres from the inadvertent application of syphilitic matter by the fingers. The fingers themselves, if their extremities be pricked or sore, may suffer from handling chancres, or from delivering infected women.

The period at which a chancre appears after the application of the venereal virus is very uncertain. Sometimes the disease follows in twelve or fifteen hours; at other times several days elapse; and in a few instances no ulceration takes place for two or three months. There is reason to believe that a chancre, so small as scarcely to be perceptible, sometimes exists; and, again, that absorption of the virus now and then follows from the most insignificant scratch, or from an abrasion of the surface of the penis so slight as to escape the patient's notice. So long as a chancre is confined to the penis, or any other part it may happen to occupy, the disease may be considered strictly local; in a greater or less time, however, if not arrested in its progress, the virus extends to the system through the medium of the absorbents, and gives rise to secondary symptoms. The first evidence of its approach towards the system, is generally an enlargement of the lymphatic glands in the vicinity of the sore, known by the name of bubo.

Bubo always takes place in those lymphatic glands in the immediate neighbourhood of the chancre, while the deeper seated or remote glands remain uncontaminated, or at least do not enlarge or suppurate. As chancre generally occupies some part of the penis, the glands of the groin are the ones commonly affected. Sometimes several glands are enlarged and form a cluster; but, according to Mr.

Hunter, one gland only is usually affected. A bubo does not invariably follow a chancre, and yet the system is not less liable in such cases to contamination. This circumstance, amongst others, has induced some surgeons to believe that bubo does not arise, as is commonly imagined, from the absorption of venereal virus, but from an inflammation in the extremities of the lymphatics excited by the chancre.* Such an idea appears not improbable, and yet it must be recollected that the matter of bubo is infectious, which could hardly happen from simple irritation excited by inflammation. Why the glands, however, contiguous to the sore should suffer while the distant ones escape, is not easily explained; for, upon the supposition of the virus being absorbed, it should follow that, by passing through the whole, all should be equally liable to disease.

Bubo seldom arises from a chronic chancre, but usually makes its appearance soon after the chancre is established. It is more apt to follow a chancre on the prepuce or frænum, than one situated on the glans penis, and is late or early in its appearance according to the degree of inflammation existing in the sore. Oftentimes a bubo remains stationary for weeks, neither tending towards resolution nor suppuration; in general, however, it is of a bright scarlet colour, exceedingly painful, and quickly runs into suppuration. Occasionally it takes on the erysipelatous inflammation. The ulceration which follows a bubo does not differ from that of common chancre, and the matter from it is equally infectious. The bottom of the ulcer is hard and so-

* See Allan's Surgery, vol. i. p. 200.

lid to the touch, and the surface either of a dark red or brownish colour, or of a yellowish cast.

Very extensive ulcerations now and then follow a bubo. I have seen each groin and the greater part of the pubes laid bare, or entirely divested of integument. In some constitutions buboes degenerate into insensible and very troublesome fistulæ, that resist every application. Sometimes the skin covering a bubo entirely closes, but not uniting with the parts beneath leaves a hollow, from which in a short time a thin serum is discharged through small holes or pores formed in the skin. In such cases, the integuments generally assume a leaden or bluish colour and have an unhealthy aspect.

Buboes frequently arise from other causes than the absorption of venereal virus—from wounds or injuries of the foot, from colds, fevers, the mechanical irritation of mercurial ointment applied to the leg or thigh of the affected side, from gonorrhœa, &c. Such swellings cannot be distinguished always from the true syphilitic bubo, and much mischief has resulted from severe and unnecessary salivations—under an imaginary idea of venereal taint. The surgeon should, therefore, carefully inquire into the history of every such complaint before he ventures to give a decided opinion respecting its nature.

Bubo should be looked upon as one of the primary symptoms of syphilis; for so long as the venereal virus is detained in the glands or their vessels, it may be considered as only on its way to the system. When the lymphatics themselves are inflamed from a chancre, there is usually

perceived a hard cord, which runs from the sore along the back of the penis towards the pubes or groin.

The *secondary* or *constitutional* symptoms of syphilis present themselves under several forms, which usually appear in regular order or succession. The parts first attacked are the throat, nose, mouth, tongue and skin; and next to these the periosteum, fasciæ, tendons, bones, ligaments, eyes, ears, &c. Frequently the skin is the texture first affected; but the throat, as far as my observation extends, commonly affords the earliest evidence of absorption of the venereal virus. The disease appears in the form of ulceration, and usually occupies the tonsils. So slight is the pain in most instances, that the discovery of the sore is often accidental. When examined, the ulcer will be found coated with an ash coloured or brownish matter, that gives it a foul or unhealthy appearance, while the surrounding parts are slightly inflamed and tinged with a copper cast. In the advanced stages of the disease the ulcer is excavated, or, as Mr. Hunter has expressed it, "dug out." These marks will be sufficient to distinguish it from other ulcerations to which the throat is liable; though in some instances the resemblance to common sore throat is so striking as to deceive the most experienced practitioner. In general, however, there is less inflammation and pain in the venereal sore throat than in the common forms of the disease.

As the ulceration advances, one or both tonsils, the uvula, velum palati, membranous part of the eustachian tube, and even the epiglottis; may be entirely destroyed—giving rise to permanent deafness and incessant cough, and

endangering the patient's life from suffocation, by permitting food and drink to enter the larynx. In many instances a communication is established between the nose and mouth—from the ulceration having destroyed the soft parts and bones of the palate. At other times, the disease travels along the schneiderian membrane, undermines the septum and cartilaginous part of the nose, destroys the periosteum covering the thin and delicate bones, which are soon rendered completely carious, and crumble away, leaving the nose sunk and ruined, the features dreadfully deformed, and the patient in the most loathsome condition, with foul and fetid matter flowing perpetually from the nostrils or into the throat, and a breath so extremely offensive as to render the sufferer hateful to himself and disgusting to his friends.

Venereal eruptions, or cutaneous blotches, do not always possess uniform characters; though the symptoms in general are sufficiently decided to enable us to form a correct diagnosis. In many instances the whole skin becomes discoloured or mottled, or covered by an efflorescence, which is often preceded by general indisposition—such as fever, restlessness, head-ache. At other times circular patches appear, in distinct spots on different parts of the body, each of which proceeds from an indurated lump of a pale red colour. The patch slowly enlarges, and in a little time its centre is rendered flat and becomes incrustated with whitish scales. These gradually desquamate and are succeeded by others of a similar appearance, until at last the skin cracks and discharges matter, which soon hardens on the surface and forms a scab of a dark brown or *copper* colour. This seldom extends beyond half an inch in dia-

meter, and after a time drops off and leaves an ulcerated surface, which gradually spreads, deepens, and becomes covered with a thick, fetid, greenish matter.

The parts commonly occupied by venereal eruptions are the back of the neck, the forehead, breast and groin. Frequently the palms of the hand and soles of the feet are affected. The extremities of the fingers and toes are also liable to suffer; in which case, the surface beneath the nail becomes red and tender, and the nail soon drops off.

The *periosteum* and *bones* are next in the order of contamination. All the bones do not appear to be equally susceptible of impression from absorption of the virus. Those thinly covered by integuments, or situated near the surface of the body, particularly the cranium, clavicle, sternum, tibia, radius and ulna, are most liable to suffer. The first evidence of the disease having reached the periosteum and bones, is an enlargement or tumour, called a *node*, which increases slowly, never attains a very large size, and is seldom painful until it has existed a considerable time. At last, however, the integuments covering the tumour become red and inflamed, deep-seated and acute pain is felt in the part, and extends from it to a considerable distance, often throughout the limbs, especially at night when the patient lies warm in bed. In a greater or less time the swelling loses its hard and solid consistence, becomes soft and fluctuating, ulceration takes place on the most prominent part and soon opens a communication with the interior, from which is discharged an ill-conditioned, glairy matter. The bone may now be felt rough and bare, or completely carious. When the node is seated on the

skull, both tables are often perforated with numerous holes, and resemble in some respects a piece of worm-eaten wood. Patients who have suffered from repeated attacks of syphilis, and have taken large quantities of mercury, often have the bones greatly enlarged and thickened throughout their whole extent. When examined also, such bones are found much heavier than usual. When a node proceeds from inflammation of the periosteum alone, the swelling may frequently be removed entirely; but it seldom wholly disappears when once the substance of the bone itself has been involved.

All the secondary symptoms of syphilis are preceded or accompanied by more or less constitutional derangement; but this is oftener observed during the latter stages of the complaint, than at any other period. The fever is either periodical or constant, and generally assumes the hectic form. Sometimes it is so severe and unrelenting, as greatly to reduce the patient's strength, producing restlessness, emaciation, diarrhoea. At other times it seems to be the immediate cause of his death.

Secondary symptoms of every description are distinguished from the primary, in not communicating a specific or infectious disease, similar to that arising from chancre or bubo. This has been proved in the most satisfactory manner by the experiments of Mr. Hunter.

Besides the venereal sore throat, blotches, and affections of the bones, there are other symptoms that have been generally considered belonging to the secondary order. These are *venereal warts, condylomatous tumours, alo-*

pecia or falling off of the hair, syphilitic ophthalmia or *iritis*, and other affections, some of which are not strictly venereal.

Venereal warts are very apt to follow chancres, and usually occupy the same situations. They arise by a narrow neck or pedicle, and are expanded on the surface—resembling a mushroom. They are sometimes exceedingly painful, and bleed profusely upon the slightest touch. Frequently the whole glans penis or vulva are completely covered by these excrescences.

Condylomatous tumours usually occupy the verge of the anus. They are firm and fleshy, broad at the base, irregular on the surface, and frequently ulcerate and become very troublesome.

Alopecia does not invariably follow the secondary symptoms of syphilis, even when the system is thoroughly contaminated. In many cases, however, large quantities of scurfs or scales form about the roots of the hair, which are soon loosened and drop out, leaving the scalp perfectly bare. The eyebrows, also, not unfrequently fall off and are seldom regenerated.

Iritis will be noticed when we treat of *ophthalmia*.

There are many diseases which bear a considerable resemblance to the primary and secondary forms of syphilis. These have been described by different writers under the name of *pseudo-syphilis*, and other similar appellations.

The question concerning the identity of syphilis and gonorrhœa might next be entered upon. Immense difficulties, however, necessarily attend an inquiry of this sort,—especially as the most opposite conclusions have been drawn from experiments performed by surgeons of equal intelligence and respectability. Thus, Mr. Hunter, from experiments made upon *himself*, as now generally understood, and upon other patients with the matter of gonorrhœa and of chancre, was induced to declare that the diseases were essentially the same, but often produced opposite effects—owing to the difference in the nature of the textures to which they were applied. Again—Vigaroux, in support of the same opinion, details the cases of six Frenchmen who had connexion with the same woman in rapid succession; the first of whom had a chancre, the second and third a gonorrhœa, the fourth and fifth a chancre, and the sixth a bubo. On the other hand, Mr. Benjamin Bell has furnished an account of several experiments, some of which were performed by medical students upon themselves, with the matter of gonorrhœa and that of chancre,—the former of which was applied to the glans penis, both by simple contact and by inoculation, without producing more than a slight inflammation and discharge from the surface; while the matter of chancre, introduced into the urethra, instead of creating gonorrhœa, produced chancre within the passage. Similar results have been obtained by other surgeons of the first respectability, all of which tend to establish the reverse of Mr. Hunter's position, and to prove that the two diseases are totally distinct from each other. How are such conflicting discrepancies to be reconciled, and with what prospect of success can we enter upon an

investigation, which seems to have puzzled and defied some of the ablest men that have ever attempted to unravel its mysteries? The arguments on each side of the question, at any rate, are too numerous to be introduced into an elementary work of this description; but I have no hesitation to affirm my belief in the existence of two distinct and separate poisons, each of which is capable of producing effects peculiar to itself.

Treatment of Syphilis.

It is well known, perhaps, that within a few years, an attempt has been made, chiefly by the British army surgeons, to remove the different forms of syphilis without the use of mercury; and in proof of the efficiency of the plan, the results of experiments, made upon a most extensive scale, have been brought forward, and are so well attested as to leave no room to question the accuracy of the details or the correctness of the inferences drawn from them. From an official document, published by Sir James M'Grigor and Dr. Franklin, it appears that nineteen hundred and forty cases of primary venereal ulcerations on the penis were cured *without* mercury, between December, 1816, and December, 1818; and that during the same period, two thousand eight hundred and twenty-seven chancres, the greater number of which were characterized by a hardened base, were cured *with* mercury. Out of this number the average period occupied in the treatment of chancres, unattended by bubo, by the non-mercurial plan was *twenty-one* days—those with bubo, *forty-five* days. On the other

hand, it is stated, that the chancres unaccompanied by bubo, and treated with mercury, required upon an average *thirty-three* days for their removal, and *fifty* days when conjoined with bubo. From these data the inference is plain, that primary syphilitic sores may be cured in a shorter time *without* the use of mercury than *with* it; and this conclusion has actually been drawn by the advocates for the non-mercurial plan of treatment, whilst at the same time they acknowledge the utility of mercury under particular circumstances, and admit that certain cases prove obstinate or incurable unless this medicine be employed. With regard to the greater or less frequency of secondary symptoms, after the removal of primary sores treated *by* mercury, or *without* it, the amount of evidence afforded up to the present time is, that such symptoms are most common when mercury has not been employed; but on the other hand, that those troublesome and severe affections of the bones—nodes, caries, &c. formerly so common, hardly ever follow the non-mercurial course, and that all the other secondary symptoms are milder and more easily subdued when mercury has not been used.

It must not be concealed, however, that there are still many respectable and intelligent surgeons, both in Britain and in other countries, who not only condemn the anti-mercurial practice, but doubt the accuracy of many of the statements furnished by the army surgeons; and contend that there is every reason to believe that the patients, supposed to have been cured without mercury, have taken the medicine surreptitiously, employed secretly caustic applications to their sores, or that cures have followed from the mercurial dressings, acknowledged by the army surgeons

themselves to have been used in numerous instances. But these inferences and suspicions, it appears to me, are unjustifiable, inasmuch as the cases brought forward in support of the practice are too numerous, and the authority of the surgeons too respectable, to admit of any doubt on the subject.

Whilst it must be acknowledged, then, that the venereal disease, contrary to the tenets of Mr. Hunter, does not become progressively worse and worse unless arrested by the use of mercury, and that complete cures have been effected in numerous instances by different remedies, yet it remains to be ascertained how far these remedies can with certainty be depended on, the particular cases to which they are adapted, and the circumstances under which mercury may be dispensed with or administered with advantage. It is true this has already been attempted, but not upon so sure a foundation as to induce us to lay aside a remedy which we know to possess undoubted sanative powers, and which we have reason to believe will be followed by no ill consequences if judiciously employed.

As *chancre*, in its commencement, must be considered strictly a local disease, local remedies will often prove sufficient to arrest its progress or effect a cure. It is proper, therefore, in every instance, provided the inflammation does not run very high, to touch the sore repeatedly with some active escharotic—such as the *lunar caustic* or the *caustic potash*. These lessen the irritability and convert the chancre into a simple ulcer, which speedily heals without contaminating the system. If, however, the chancre has existed for some time previous to the application of the

caustic, in all probability no benefit will result, owing to the virus having extended beyond the sore, which indeed, under such circumstances, may be rendered worse, or at least larger, by the caustic.

It will then become necessary to employ internal remedies, and there are none so effectual as mercurial preparations. Of these *calomel* and the *blue pill* will be found most useful. The former may be given alone in the dose of a grain, morning and evening, or in combination with opium, which prevents the medicine from passing off by stool; the latter may be administered two or three times a day, in the proportion of five grains at each dose. In general the blue pill should be preferred to calomel, inasmuch as it is milder and more gradual in its operation. With particular constitutions, however, it disagrees—owing, perhaps, in some instances to an improper mode of preparing the medicine.

Conjoined with the internal use of mercury, its application to the skin in the form of inunction will often prove absolutely necessary. Two or three drachms of the ointment should be rubbed on the inner surface of the thighs, every morning and evening, by an assistant, until the greater part of it disappears. If pimples or ulcerations arise from the friction, which is often the case, the rubbing should be discontinued or transferred to the legs and arms. Sometimes an inflammation is excited in the course of the absorbents by mercurial friction, from which a bubo arises. Under these circumstances, it must immediately be laid aside.

In no instance can it be necessary to *push* the mercury, as it is termed, either for the cure of a chancre, or any other stage of syphilis. Nothing more will at any time be required than to touch the mouth lightly or produce a gentle ptyalism. From inattention to this, many patients have suffered immensely, and others have lost their lives.

As *local* applications to the chancre, several articles will prove highly serviceable. The *black wash*, prepared by adding two drachms of calomel to an ounce of lime water, I have used with the utmost advantage. The mixture should be well shaken previous to its application, and the cavity of the chancre covered by the thick powder that afterwards settles at the bottom of the vial. Dry lint sometimes forms an excellent application to a chancre. When the sore requires stimulating, I have known no articles so useful as the compound ointment of the acetate of lead, the yellow wash, citrine ointment, and the diluted tincture of the muriate of iron.

Some chancres spread and become extremely indolent, or else are converted into indurated excrescences, which occasionally attain a large size and feel like an ordinary schirrus. At other times the ulcer burrows or creeps from one part of the penis to another, opens the cells of the corpus spongiosum, and gives rise to profuse hemorrhage, and eventually, if not arrested, destroys the penis. In all these cases, I have derived great benefit from the internal use of the *phosphate* of mercury, cautiously administered in doses of half a grain twice a day, and locally from adhesive plasters, which, by drawing together the edges of the sore, often promote their reunion.

To obviate *erections*, which frequently cause the chancre to spread by breaking up the adhesions as fast as they are formed, the internal use of camphor will be found indispensable.

Sometimes chancres, instead of becoming indolent, take on acute inflammation, which may run so high as to terminate in mortification and loss of the penis. In bad constitutions, this state is frequently brought about by the operation of mercury. When this happens, the medicine should instantly be laid aside, and the patient placed on a low diet, whilst blood-letting and purgatives are freely employed, together with warm poultices to the penis and opiate and other injections between the glans and prepuce.

If the chancre is accompanied by *phymosis*, or *paraphymosis*, as often happens, we should never think of slitting up the prepuce, during the height of the inflammation, as sloughing would be very apt to follow, or at any rate the cut edges be converted into chancres. Simple and unimportant as an operation of this kind may appear, I have known mortification and death to follow from it in one instance, which occurred not long since in the practice of a respectable surgeon of this city. The true practice, in all such cases, is to combat the inflammatory symptoms by appropriate remedies.

In spite of all our efforts, it frequently happens, that the disease is not removed, but pursues its course towards the system and appears next in the shape of *bubo*. To prevent this from terminating by suppuration, blood-letting, purgatives, and other parts of the antiphlogistic system should

be immediately resorted to. These, unaided, will often prove sufficient to discuss the swelling or to procure resolution; but in many instances this purpose cannot be effected until the system is placed under the influence of mercury; and the sooner, therefore, this event can be brought about the better. It may be proper, however, to state, that mercury, when employed in certain irritable constitutions, instead of resolving a bubo, will sometimes cause it to suppurate and to degenerate into a troublesome sore; and again—that the same effect may occasionally arise from the inflammation produced by the mechanical operation of friction, in the act of introducing the mercury into the thigh of the affected side. Whenever there is reason to suspect that inordinate irritation proceeds from either of these causes, the mercury must be discontinued and the patient confined to the horizontal position, in order to keep the parts as still as possible, whilst at the same time cold saturnine solutions are applied constantly to the groin; or what frequently answers a better purpose, the tumour may be covered by a *blister*, which has always been a favourite remedy with Dr. Physick in the early stage of bubo. Some surgeons, under similar circumstances, recommend leeches to the swelling. I have known, however, great irritation and troublesome ulcerations to follow from the bites of these animals when applied to the inflamed gland, and therefore seldom prescribe them in such cases.

Should these remedies fail, and suppuration become inevitable, then the mercury should be resumed, and warm poultices applied to the groin until the matter is discharged. Sometimes it happens that suppuration is established, and

yet the matter, owing to the impression made upon the disease by mercury, is afterwards absorbed and the skin remains entire. If there is reason to think such an event probable, the poultice should be laid aside, and a simple dressing substituted. On the other hand, when the matter is copiously secreted, and at the same time backward in its approach to the surface, the abscess should be opened by the lancet or caustic. The former I prefer in every instance, as it gives less pain than the caustic and discharges the matter at once. Dr. Parrish informs me, that he has sometimes treated suppurating buboes very successfully, by making a number of small openings through the skin, discharging the matter gradually, and afterwards pressing the sides of the cavity together by a soft sponge or compress.

When the ulceration which frequently follows a bubo proves obstinate and spreads, the applications recommended for chancre, particularly the *black wash*, should be tried. If the edges of the sore become hard and insensible, they may be pared away with the knife or destroyed by repeated touches with caustic. Indeed, the whole surface of an ulcerated bubo is often rendered so indolent as to require a very liberal use of caustic, savin powder, and other articles equally stimulating.

The treatment of *secondary* symptoms must depend upon the extent of the disease. In general, mercury will be necessary throughout every stage; though the quantity administered will be trivial, compared with that employed for the removal of primary symptoms. There are certain preparations of the medicine also, which seem particularly adapted to the advanced stages of syphilis.

The *muriate* of mercury or corrosive sublimate, has acquired in this particular a very high reputation, and as I think deservedly; many practitioners, indeed, very much depend upon it throughout every form of the complaint. Mr. Pearson, however, whose opportunities of testing the anti-venereal powers of various medicines have been very extensive, holds it in low estimation, when applied to the treatment of primary symptoms; whilst he admits that it is "peculiarly efficacious in relieving venereal pains, in healing ulcers of the throat, and in promoting the desquamation of eruptions." There are various modes of administering the article, which, if given in large doses and in an improper vehicle, will frequently give rise to excessive thirst, burning in the throat, nausea, vomiting and other violent symptoms. For several years past I have used the medicine very extensively in all the consecutive affections, and frequently with immense advantage, in doses of thirty or forty drops of a solution, composed of a grain of the salt to an ounce and an half of water, and given two or three times a day. As a *gargle*, also, in venereal sore throat, there is no application more effectual.

Should the corrosive sublimate, internally administered, prove insufficient to touch the mouth or remove the disease, the blue pill and calomel may be resorted to; and if these also fail, there is another mode, and the most expeditious we are acquainted with, of introducing the medicine into the system—by *fumigation*.

This practice was known at a very early period, and indeed employed extensively in every form of syphilis, in preference to the internal use of mercury. It appears at

one time to have been abandoned, but afterwards revived by Lalouette, a celebrated physician at Paris, who states, that during the space of thirty-five years, he had cured by means of it upwards of four hundred patients, after all the ordinary remedies had failed. Upon the recommendation of Mr. Abernethy, I commenced many years ago this plan of treatment, and found it greatly to exceed my expectations,—producing in a very short time a decided impression, after the system had resisted for weeks or months the operations of calomel and the blue pill. It is well known, indeed, that there are many patients upon whom these and most other preparations of mercury fail to induce a salivant effect—which is afterwards brought about very speedily by fumigation. This circumstance has been adduced as an objection to the general employment of the remedy, inasmuch as it is difficult to introduce into the system a sufficient quantity to insure permanent benefit—owing to the rapidity with which the mercury operates when thus administered.

There are two or three modes of conducting the fumigating process; one of which, and perhaps the most simple, is to seat the patient, who is previously stript to the skin, in a common arm chair, and surround the whole body, with the exception of the head and neck, with thick blankets. Beneath the chair is then placed a common iron pot or chafing-dish, full of live coals, and over this a thin sheet of iron, the surface of which, when heated, must be strewed with some mercurial preparation capable of volatilization. The fumes ascending, penetrate the skin in every direction and enter perhaps the lungs. A copious perspiration is usually the result of the operation; and to prevent the patient

from taking cold, he should be carefully wrapt in the blankets and conveyed to bed.

Another method, more complicated and perhaps not more effectual, is to enclose the patient in a box, resembling a sedan chair, having an opening at the top to let out the head, and another at the bottom holding a small furnace. The preparations usually employed in either process are factitious cinnabar, the black sulphuret of mercury, or else a grey powder, formed by mixing together four ounces of calomel, two drachms of aqua ammoniæ and six ounces of distilled water. This powder is separated by filter, and dried, and is preferred by Mr. Abernethy to any other in use.

The great advantage possessed by fumigation over the common modes of introducing mercury is, as before mentioned, its speedy operation, which renders it particularly valuable in all those ulcerations of the throat and nose, which are rapidly spreading, and threaten destruction to the delicate parts amongst which they are seated. From extensive experience, I can recommend the plan, in all such cases, with the utmost confidence. Nor have I found it less effectual in dispelling venereal discolourations of the skin and blotches.

Besides mercurial preparations, there are others equally efficacious in breaking up the remnants of syphilis. These are the mineral acids, used singly or conjointly, certain vegetable extracts, particularly sarsaparilla, guaiacum, mezereon, administered in the form of decoction or mixed with syrups, and generally containing more or less of corrosive sublimate—such as the *syrup* of Cuisiniere, the *de-*

purative ptysan of Vigaroux, the *rob anti-syphilitique* of Laffecteur, the *panacea* of Swaim; all which, in particular cases, often prove extremely serviceable, in relieving pain, healing ulcerations, or in restoring constitutions enfeebled or injured by the abuse of mercury. Of the acids, the *nitro-muriatic*, as used by Dr. Scott in the treatment of hepatitis, and by Mr. Charles Bell for secondary syphilitic symptoms, will be found the most convenient and serviceable. In many cases the *muriate of gold* effects a cure, after the failure of all other remedies.

Nodes are often extremely difficult to remove. In general they are benefited by mercury slowly introduced, and by external applications, such as the *linimentum hydrargyri ammoniatum*.^{*} As an internal remedy, *arsenic* has been found highly serviceable in obstinate nodes. Dr. Dewees informs me, that he has successfully prescribed the medicine in such cases for the last twenty years, and Dr. Colhoun of this city, who has published a short account of the remedy as adapted to these affections, speaks in high terms of its utility.

Venereal warts may be removed by the knife or scissors, and sometimes by the application of acetic acid, the compound powders of rhubarb or savin, the muriated tincture of iron, butter of antimony, finely levigated arsenic, &c.

^{*} The following formula of this medicine will answer for a variety of surgical purposes. R. Ung. hydrargyri fort. Adip. suillæ. præp. sing. ʒi. Camphoræ. ʒij. Ammoniaë liq. ʒiv. First rub the camphor with a few drops of alcohol, and then with the ointment and lard, and lastly add by degrees the liquor ammoniaë, and mix the whole together in a glass mortar.

Consult *Hunter on the Venereal Disease*, by Adams—*Benjamin Bell on Lues Venerea*—*Adams on Morbid Poisons*—*Sawrey's Inquiry into some of the Effects of the Venereal Poison*, 1802—*Swediaur on Syphilis, &c.*, translated by Hewson—*Abernethy's Surgical Works*, vol. 1—*Blair's Essay on the Venereal Disease, and the Effects of Nitrous Acid and other analogous Remedies, lately proposed as Substitutes for Mercury*, 1808—*Pearson on the Effects of various Articles of the Materia Medica in the Cure of Lues Venerea*, edit. 2d. 1807—*Carmichael's Essays on the Venereal Diseases which have been confounded with Syphilis*, 1814—*Carmichael's Observations on the Symptoms and Specific Distinctions of Venereal Diseases*, 1818—*Rose's Observations on the Treatment of Syphilis, with an Account of several Cases in which a Cure was effected without Mercury*, in *Medico-Chirurgical Transactions*, vol. 8—*Hennen's Observations on Syphilis*, in his *Principles of Military Surgery*, p. 488—*Evans's Remarks on Ulcerations of the Genital Organs*, 1819—*Bacot on Syphilis*, 1821—*Charles Bell's Report on the Use of the Nitro-Muriatic Acid Bath in certain obscure Cases of Syphilis*, in his *Surgical Observations*, vol. 1. p. 338.

CHAPTER VII.

FRACTURES.

THE bones are all subject to fracture; though some yield more readily than others. In general, the long or cylindrical bones more frequently suffer than the short or flat ones, inasmuch as they serve a greater number of purposes, and are commonly under the influence and direction of large and powerful muscles.

A bone may be broken either by a direct blow, or by force applied to both of its extremities at the same moment. In the former case, the fracture occurs at the spot upon which the injury is immediately received; in the latter, the bone commonly yields about its centre, or at some intermediate portion. The muscles are always more or less concerned in the production of fractures, and in many instances without any other co-operating power break the largest and strongest bones. At other times, the bones themselves, from old age and diseases,* are rendered brittle and are

* A patient of mine, a Mr. Green, residing near Trenton in Jersey, has a son, now nineteen years of age, who from infancy up to the present period has been subject to fractures from the slightest causes, owing to an extraordinary brittleness of the bones. The bones of the arm, fore-arm, thigh, and leg, have all been broken repeatedly, even from so trivial an accident as catching the foot in a fold of carpet whilst walking across the room. The clavicles have suffered more than any other bone—having been fractured eight times. What is remarkable,

easily fractured, either from external violence or muscular action.

Fractures are most frequent during very cold weather. On this account many have supposed that cold affects the texture of bones, and predisposes them to give way. But the true explanation is, that persons in walking while the ground is hard and slippery, make unusual efforts to sustain themselves, by which the muscles are rendered tense and thrown into full action, and if they happen to fall, the two powers combined—the resistance of the frozen earth and inordinate muscular exertion—very readily produce fractures and sometimes more important injuries.

Fractures have been divided into different *species*—according to the extent of the injury, and the particular direction in which the fibres of the bone happen to yield. Thus, we have a simple, compound, and complicated fracture; and again, a transverse, oblique, comminutive, and longitudinal fracture. By the term *simple* fracture, is understood a mere separation of bony fibres, unattended by severe contusion or external wound. From this, a *compound* fracture differs, in being conjoined with an external wound, or with a protruded bone. A *complicated* fracture implies that the bone is broken at more than one place, or is combined with luxation, with laceration of one or more

the boy has always enjoyed excellent health, and the bones have united without difficulty or much deformity. The above was published in 1824; since then this patient died in the twenty-third year of his age, from partial dislocation of the first and second vertebræ of the neck, after a painful illness of fourteen weeks. Altogether he had experienced twenty-four fractures.

large vessels, or rupture of ligaments, tendons, &c. or with a gun-shot wound. A fracture is said to be *transverse*, when its direction is perpendicular to the axis of the bone. It is denominated *oblique*, when it deviates from the perpendicular direction. In *comminutive* fracture, the bone is broken into several pieces or crushed into fragments. A *longitudinal* fracture runs parallel with the axis of the bone.

The *signs* of fracture are not always very decisive. In general, however, *crepitation*, or that particular noise or sensation produced by rubbing together the fragments of a broken bone, is more to be relied on than any other, and is an almost certain indication of fracture. Added to this, there is usually more or less deformity, pain, swelling, inability to use or move the limb. But these symptoms may attend luxation and other diseases, and are therefore not unequivocal proofs of fracture. Besides, it is possible for a patient actually to labour under fracture of one or more bones, and yet, from interlocking of the fragments, or from a sound bone serving as a splint and supporting the broken one, no distortion will be perceived. Many instances are related of patients walking about, under these circumstances, for some time after the accident.*

The *prognosis* in fracture will depend very much upon the extent of the injury, the constitution and age of the patient, the direction of the fracture, and the particular bone broken. Complicated and compound fractures will

* See Dorsey's Elements, vol. i. p. 113, and Allan's Surgery, vol. ii. p. 60.

prove more dangerous than any others, especially if they occur in old people and in bad habits of body. An oblique fracture is commonly more difficult to manage than a transverse one, owing to the fragments of bone overlapping from muscular contraction. It is possible, however, for the ends of a bone, when broken transversely, to pass each other; though this seldom happens unless the cause of the fracture act with uncommon violence, or some subsequent force be applied. In either case, the parts will sustain more injury, and the danger will be greater, than if the bone were broken obliquely and by a moderate force.

The *direction* of displacement, or derangement of the fragments of a broken bone, must always depend either upon the force by which the accident was produced, upon muscular action or upon the weight of the body, or that of the injured part. Sometimes the derangement is *angular*, sometimes *longitudinal* or parallel with the axis of the bone, in other instances in the direction of its *diameter*, and again—in that of its *circumference*.

Treatment of Fractures.

The general indications in the treatment of fractures are, to prevent or subdue inflammation, and to coaptate and retain the fragments in contact by appropriate mechanical means, until they are restored to their pristine condition through the medium of callus. The former are best accomplished by the antiphlogistic system and by position—

the latter by extension, counter-extension, splints and bandages.

By *extension* is understood a force applied to the lower fragment, sufficient to remove it from the superior fragment; by *counter-extension*, a power calculated to resist the operations of extension. These means are not necessary, however, or applicable to all fractures. Frequently coaptation or a proper adjustment of the fragments by the fingers will answer every purpose. In other instances, position, splints and bandages are only required.

The *bandages* usually employed in fractures are made of coarse muslin or hummum, an article, from its flexibility and roughness, peculiarly adapted to fit accurately and adhere closely to any part of the body. The muslin should always be washed before it is used, and the selvage or rough edge torn off. Bandages should, if possible be free from seams, which by pressure often excite irritation or produce welts in the skin, that annoy the patient more than the fracture itself. The single-headed roller and the bandage of *Scultetus* have superseded most others, and are adapted to a great variety of purposes. The roller is chiefly employed in fractures of the upper extremities, the bones of the chest, &c. In general, it accommodates itself best to the shape of the part when somewhat narrow.

The bandage of *Scultetus* is chiefly useful in fractures of the thigh and leg. It consists of numerous strips or pieces of the same breadth, and of equal or unequal length, according to the shape of the part it is intended to surround.

Each piece overlaps the other about two-thirds. The great value of this bandage arises from the facility with which it can be removed and re-applied, without disturbing or moving the limb. It will be more particularly described hereafter.

To apply a roller or any other bandage with neatness and effect, a great deal of practice will be required. A student should be very careful, however, not to fall into the error I have known some young surgeons commit, from aiming at feats of dexterity and despatch—by drawing the roller with immoderate tightness in order to make it lay smooth and hide rough edges—a practice well enough on the dead subject, but followed by pain, obstruction of the circulation, and other ill consequences when applied to the living body. Again—the more a surgeon accustoms himself to roll up his bandages with his own hands, the more dexterity will he acquire in applying them.

Splints are made of different materials—of pasteboard, binders' boards, wood, and tin. Binders' boards, however, answer a better purpose than the others in most fractures, inasmuch as they adapt themselves when moist to the shape of the injured part, and when dry have sufficient strength and stiffness to retain the position given to them. Common pasteboard is too thin and flexible to give any support to a fractured bone, and tin, from its hard and unyielding nature, cannot be employed without creating pain or uneasiness. Wooden splints are chiefly adapted to fractures of the long and large cylindrical bones—as those of the thigh and leg. In general, splints should at least equal in length the fractured bone; sometimes they are required longer.

The time necessary for reunion and consolidation of fractures, must vary according to the age and constitution of the patient, the situation and extent of the fracture, and some other circumstances. Young and healthy subjects recover in a shorter time than old and infirm, and the process of reunion is sooner completed in a small than a large bone. From two to eight weeks usually elapse before consolidation is established, but a much longer time will be required for perfect restoration of the injured part.

SECTION I.

Fracture of the Nose, &c.

THE bones of the nose may be fractured and driven in by a blow; or they may be crushed by the passage of a wheel, or by a gun-shot. In either case there is commonly more or less concussion of the brain. Sometimes the impulse is communicated to the septum, and thence transmitted to the delicate cribriform plate of the ethmoid bone, which is broken up and forced upon the brain—producing violent symptoms and even death. Such accidents, however, are rare; and the usual symptoms are severe pain, copious flow of blood, and difficulty of breathing. If the case has been neglected, permanent deformity may ensue—from lateral distortion or depression of the bones. From the same cause, also, incurable epiphora or fistula lachrymalis may result.

The cheek and upper jaw bones are seldom fractured, except by a gun-shot wound, or from the application of very great violence. In two instances I have known a considerable portion of the alveolar process broken off along with the teeth, from immoderate force employed by an ignorant dentist in an attempt to extract a large stump. The antrum maxillare in one of the patients was completely exposed. Le Dran has furnished an interesting case of fracture of the upper jaw, in which four of the molar teeth,

along with their alveolar processes, were broken up and forced under the roof of the mouth.

Treatment of Fracture of the Nose.

The nasal bones when fractured should be elevated and replaced as soon as possible, otherwise the pain and tumefaction become so great, that it is not easy to discover the direction of displacement; and before these symptoms can be reduced, the bones may become fixed in their unnatural situation, and create great deformity and fistula lachrymalis. A case of the kind has been related by Boyer.

To restore the fragments to their proper places, the end of a female catheter or a strong probe, or any similar instrument, may be introduced into the nostrils and used as a lever, while the fingers are employed externally in modelling the parts to their natural shape. After the fragments have been elevated, they generally preserve their situation without the assistance of quills, lint, and other contrivances advised to be stuffed into the nostrils, which cannot prove serviceable, but on the contrary must add to the irritation. The remainder of the treatment consists in removing the inflammation; after which the bones soon become firm; and a cure follows.

Fractures of the upper jaw and bones of the cheek seldom require any other remedies than those calculated to subdue inflammation. When large portions of the alveolar processes, to which the teeth adhere, have been broken, and

remain only attached to the soft parts, it has been proposed to replace the fragments and secure them, by fastening the insulated teeth with silk or thread to those in the sound part of the bone. This was successfully practised in Le Dran's case, but I much question the necessity of the measure.

SECTION II.

Fracture of the Lower Jaw.

THE lower jaw, notwithstanding its mobility, is frequently fractured. The fracture may take place at or near the symphysis, between the symphysis and angle, at the angle itself, or in the condyloid or coronoid processes. Sometimes it is fractured in two places—on each side of the chin; in which case the chin is insulated, and there are three fragments and two fractures. The *coronoid* process, being covered and protected by very strong and fleshy muscles, is seldom broken; nor is the *condyloid* much exposed to such injuries. A separation of the jaw at the symphysis is usually met with amongst young subjects; though I have seen one instance of it in a man beyond forty years of age.

Fracture commonly takes place on one side only of the jaw, and the most frequent seat of it is intermediate to the symphysis and angle. The *direction* of the fracture may be oblique or transverse; except in fractures of the alveolar ridge, in which case the direction will be longitudinal.

The *signs* of a fractured lower jaw are generally very distinct and evident. Crepitation can almost always be observed, and upon looking into the mouth the teeth will be found irregular and oftentimes loosened. When the chin has been insulated by a fracture on each side of it, it

will be drawn downward, considerably below the level of the adjoining fragments, by the action of the muscles of the throat inserted into its point.

Fracture of the neck of the condyloid process may generally be distinguished by the grating noise and pain produced in the neighbourhood of the ear when the jaw is moved, and by the circumstance of the condyle being dragged forward by the action of the pterygoideus externus muscle.

Treatment of Fracture of the Lower Jaw.

The surgeon having carefully examined the injured parts, and replaced such teeth as are shaken or loose, runs his fingers along the margin of the jaw, models the parts into a proper shape, and closes the mouth firmly, making the lower teeth rest fairly against the upper. Then a cotton or linen compress of moderate thickness, reaching from the angle of the jaw nearly to the chin, is placed beneath and held by an assistant, while the surgeon takes a roller, four or five yards long, an inch and an half wide, and passes it by several successive turns under the jaw up along the sides of the face and over the head; now changing the course of the bandage, he causes it to pass off at a right angle from the perpendicular cast, and to encircle the temple, occiput and forehead horizontally by several turns; finally, to render the whole more secure, several additional horizontal turns are made around the back of the neck, under the ear, along the base of the jaw, over the point of

the chin. To prevent the roller from slipping or changing its position, a short piece may be secured by a pin to the horizontal turn that encircles the forehead, and passed backwards along the centre of the head as far as the neck, where it must be tacked to the lower horizontal turn—taking care to fix one or more pins at every point at which the roller has crossed. This simple method of securing a fractured jaw I have practised very successfully for several years. The operation is more easily performed than described, but may be well understood by examination of the sketch in *Plate VIII.*

Whatever plan may be pursued in bandaging the jaw, there can be no necessity for the interposition of pieces of cork between the teeth, or for pulling a tooth to nourish the patient, or for the introduction of a gum elastic catheter through the nostrils for the same purpose, as there is always sufficient space between the teeth to enable the patient to imbibe broth or any other thin fluid placed between his lips. During the cure the jaw should be kept as still as possible, otherwise deformity is apt to ensue.



SECTION III.

Fracture of the Vertebrae.

THE bones composing the spinal column are seldom fractured. Such accidents, however, when they do occur, are always the result of great violence, and are generally followed, immediately or remotely, by most severe symptoms or by death. In some cases there is violent concussion of the spine without fracture, which gives rise to paralysis of the lower extremities; but this subsides in a little time and the patient recovers. The effects of fracture are more permanent, and although at first not always severe, may terminate most unfavourably. Sometimes an effusion of blood is found upon dissection, either on the outer or inner surface of the spinal sheath; at other times the spinal marrow is compressed or wounded by a projecting fragment of bone. From either cause high excitement and paralysis ensue, and at a later period inflammation and suppuration within the membranes of the spinal marrow. So copious, indeed, in some instances is the matter, that it travels along the sheath, and is lodged at a great distance from the injured part. It is this thickening of the sheath from inflammation and suppuration within its cavity, that is the cause of death in nine cases out of ten. This explanation was first given by Mr. Charles Bell, the only writer that appears to have taken a correct view of the pathology and treatment of injuries of the spine.

Fractures of the vertebrae produce different effects, according to the particular situation of the bone injured. If the fracture take place above the *fourth cervical* vertebra, death follows almost instantaneously—owing to the injury sustained by the phrenic nerve. When the fracture occurs below the fourth vertebra, there is usually paralysis of the arms and difficult respiration, and death follows in four or five days.

Fractures of the *dorsal* vertebrae are succeeded by paralysis of the lower extremities and by great torpor of the intestines. In some cases, the abdomen becomes enormously distended from quantities of air, contained within the bowels. The patient seldom lives beyond the third or fourth week.

When the *lumbar* vertebrae are fractured, the bladder and rectum lose their powers of retention, and the urine and faeces pass away involuntarily; the lower extremities are completely paralyzed and perfectly insensible to the most powerful stimulus, while the heat and circulation in the limbs are but slightly if at all diminished. Death follows at a later period than after similar injuries of the cervical and dorsal vertebrae; though the patient seldom survives beyond five or six weeks.

Fracture of the *spinous processes* of the vertebrae is seldom followed by any serious consequences, unless accompanied by violent concussion or some other injury.

Treatment of Fracture of the Vertebrae.

From what has been said it will appear that little benefit may be expected in most cases from any treatment that can be adopted. It was long ago proposed to cut down upon the injured part, and remove by the trephine the displaced portion of bone compressing the spinal marrow. Such an operation was actually performed by Mr. Henry Cline but without success. I concur, however, entirely with Mr. Charles Bell, in thinking "that the palsy is a consequence of the swelling of the membranes, and proceeds from inflammation; and if you cut down upon the bone and saw it out, and expose these membranes, you will not only increase the swelling and thickening of the involving membranes, but you will most probably raise such direct inflammation and mischief as to cut off the patient suddenly."* Should the patient survive the immediate effects of the injury, the urine must be drawn off frequently by the catheter, and such measures taken as are calculated to obviate inflammation within the sheath of the spinal marrow. Afterwards stimulating frictions, issues, &c. may perhaps prove serviceable.

* Surgical Observations, vol. i. p. 160.

SECTION IV.

Fracture of the Ribs.

THE ribs may be fractured from a direct blow or from force applied to their extremities. In the former case an *internal* angular derangement will follow—in the latter the angle will be salient *externally*. Owing to the extremities of the ribs being strongly connected to the sternum and spine, the fractured portions cannot overlap or pass each other; but derangement may occur in almost any other direction, though the angular is most common. Boyer has declared that derangement cannot happen in the direction of the diameter of a rib: this, however, is a mistake, as several specimens in my cabinet sufficiently prove.

Fracture of a rib may be transverse, oblique, compound, complicated, and comminuted. The transverse are most frequent, although the oblique are by no means uncommon. The others are the most dangerous, and are generally combined with rupture of the intercostal arteries, emphysema, and injuries of the lungs.

It is not always easy to discover a fracture of the rib. Sometimes there is distinct crepitation, and then the nature of the accident is rendered very plain. The presence of emphysema also affords almost certain evidence of the existence of fracture. Generally the patient complains of difficult respiration, especially when lying in the recum-

bent posture, and of sharp, pricking pain in the seat of the injury, which is increased upon making a full inspiration or upon coughing.

Treatment of Fracture of the Ribs.

Little benefit commonly results from an attempt to coaptate the fractured ends of a rib. When the force, however, causing the injury has been very violent, and the fragments have been driven internally or towards the pleura and lungs, well directed pressure upon each extremity of the rib may cause them to resume their former position. On the contrary, pressure applied to the fracture itself will become necessary when there is angular derangement externally. But the chief indication in the treatment is to oblige the patient to breathe by the diaphragm and abdominal muscles, in order to keep the intercostal muscles at rest while the process of reunion is taking place. This is accomplished by a broad roller, passed circularly about the chest, and made to envelop the greater part of it, placing a *single* compress, if the derangement be external, over the fractured part and under the roller, and *two* if the derangement be internal—one at each end of the rib. These cooperate with the bandage in forcing the fragments into their proper places. Conjoined with this treatment, general blood-letting and elevation of the patient's shoulders by pillows placed behind his back, will prove extremely useful. Should hemorrhage take place from a wound of the intercostal artery, or emphysema follow from a wounded lung, the treatment formerly pointed out, under the head of *Wounds of the Chest*, must be pursued.

SECTION V.

Fracture of the Sternum.

FRACTURE of the sternum is usually the result of considerable violence; hence the mischief that ensues is not always confined to the bone, but extends to the sensible membranes and organs within the chest: these inflame and suppurate, and not unfrequently considerable collections of pus take place in the anterior mediastinum—either from the immediate injury or from subsequent caries of the bone. I have met with several cases of the kind, and had occasion, three or four years ago, in the Alms-house Infirmary, twice to trephine the sternum in two different patients, on account of caries and lodgment of matter.

Fracture of the sternum may be known by the incessant grating of the fragments upon each other during respiration, which is so remarkable in some instances as to be heard a considerable distance. Besides this sign, which is very decisive, there are others—palpitation of the heart, difficult respiration, severe pain and troublesome cough. The bone will sometimes be found broken in three or four pieces. The direction of the fracture is commonly transverse.

Treatment of Fracture of the Sternum.

The chief indications in the treatment of this injury, are to prevent or subdue inflammation, and to appease the incessant cough and difficult respiration that usually attend. The former are best accomplished by repeated blood-letting,—the latter by opiates and by supporting the patient in bed in a sitting posture.

Quiescence of the chest, also, is essential, and readily effected by a roller drawn with sufficient tightness to impede the action of the intercostal muscles.

Should matter form beneath the sternum, or collect within the mediastinum, an opening should be made cautiously with the crown of a trephine—so small as not to exceed half an inch in diameter. The same instrument, aided by Hey's saw, bone nippers, and forceps, will also answer for removing carious portions of bone—at the same time bearing in mind, not to be too officious in picking away or scraping the bone, which by such means may be rendered diseased or made to exfoliate, when, if it had been left to nature, it might have recovered.

SECTION VI.

Fracture of the Clavicle.

THE clavicle, from its exposed situation and delicate form, is peculiarly subject to fracture. It may be broken by a force directly applied to it, or by a *counter-stroke*. In the latter case, the effect is generally produced by a fall upon the point of the shoulder, or on the hand which is instinctively put forward to save the body. From either cause fracture is most common about the middle or vaulted part of the bone, is usually oblique or transverse, and seldom compound or complicated.

The accident is easily distinguished from other injuries by crepitation, by the depression of the humeral beneath the level of the sternal fragment, by the shoulder, of which the clavicle is the support or stay, falling forward upon the breast and sinking below the level of the opposite shoulder, by the inability experienced by the patient in carrying the hand to the head without bending the forearm and dropping the head to meet it, and by the particular attitude which most patients assume to relieve themselves from pain—supporting the injured limb with the opposite hand, and inclining the head and body towards the affected side.

Fracture of the clavicle may occur at or near the humeral or sternal extremities of the bone. The former seldom happens, owing to the thickness and strength of the hume-

ral portion, and to its close connexion with the scapula, to which it is tied by very firm and unyielding ligaments. Fracture of the sternal end is commonly the result of counter-stroke.

Treatment of Fracture of the Clavicle.

As the shoulder sinks and approaches the sternum after the clavicle is fractured, it follows that the chief indications in the treatment are, to elevate it again to its natural height, and at the same time to carry it backwards and outwards, and there retain it by an appropriate apparatus. The two first indications had long been acknowledged as necessary, but the third and most important of all—that of keeping the shoulder *outwards*—was originally suggested by Desault, who, upon the principles just pointed out, has devised an apparatus for reducing and maintaining in contact the fragments of bone, infinitely more efficacious than any other ever invented, at the same time extremely simple in construction and composed of materials easily obtained in any situation however remote.

This apparatus consists of three rollers, each three inches wide and seven or eight yards long—a pad, the shape of a wedge, composed of pieces of old linen, four or five inches broad, three inches thick at the base, and in length equal to the humerus, having at each corner of the base a strip of muslin an inch wide and a yard and an half long—three compresses—a small sling for supporting the forearm—and a piece of linen or muslin large enough to cover the bandages and envelop the whole chest.

The surgeon directs an assistant, while the patient is in a standing or sitting position, to elevate the arm of the injured side, and keep it extended at a right angle with the body. He then takes the pad, and placing its base or large extremity in the armpit, secures it slightly to the body by the muslin strips attached to its corners. *See Plate IX. fig. 1.*

The end of one of the rollers is now placed on the pad, and fixed by two or three circular turns around the body; the roller next ascends obliquely over the front of the chest to the sound shoulder, passes over this posteriorly under the armpit, appears again in front of the chest, makes a circular turn nearly around the body, ascends from behind to the sound shoulder, passes over it and under the armpit, appears again on the back of the chest, and finishes by circular turns which cover the whole pad and fix it securely to the body. *See Plate IX. fig. 2.*

The next step of the operation is to reduce the fracture or to restore the ends of the bone to their proper places. To accomplish this, the surgeon takes hold of the arm, carries it downwards, lays it closely along the pad, bends the forearm across the chest, runs his fingers along the clavicle, and adjusts the fragments. The deformity disappears in an instant, and the principle upon which the bone is replaced immediately understood—the arm being converted into a lever of the first kind serves as the handle or power, while the clavicle forms the resistance and the pad the fulcrum or prop. To keep the bone in its position, the surgeon next takes a second roller, whilst an assistant maintains the arm in contact with the pad, and commencing



Fig. 1.

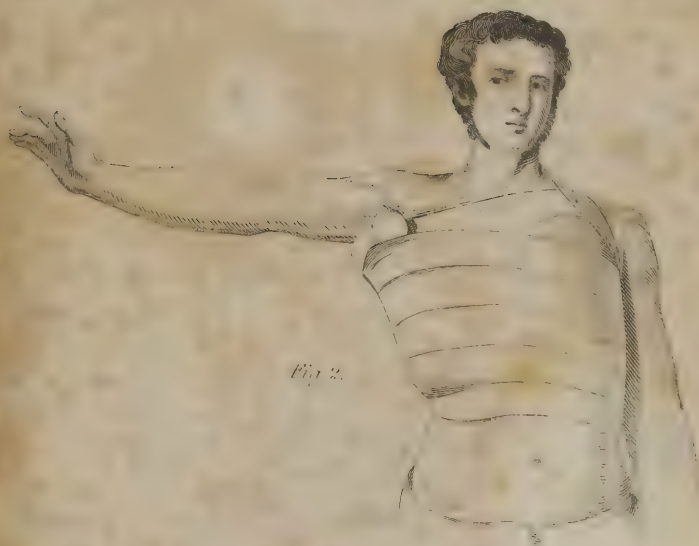


Fig. 2.

Drawn from Life by T. Sully & Engraved by C. G. Heath.



Fig. 1.

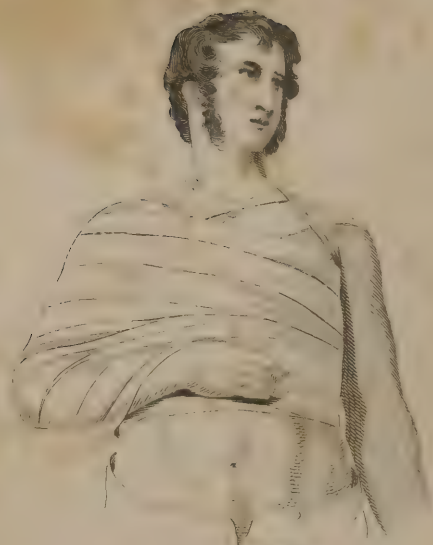


Fig. 2.



Drawn from Life by T. Sully & Engraved by C. C. Childs.

at the armpit of the sound side carries it to the shoulder of the injured side, and thence by oblique and circular turns around the body and arm, gradually descending, (each cast overlapping the other and tightened in proportion to its descent,) until it passes under the elbow as far as the middle of the forearm. This fulfils the second and most important indication—to retain the shoulder *outwards*. See *Plate X. fig. 1.*

The third and last roller must now be applied. Commencing at the armpit of the sound side, the surgeon carries the roller obliquely upwards over the injured shoulder, (previously covering the clavicle with the compresses,) down on the posterior part of the arm, under the elbow, obliquely upwards across the chest to the armpit whence it started, over the back to the shoulder of the affected side, across the compresses, down in front of the arm, under the elbow, across the back to the sound armpit,—from which it commences again to run the same course until the roller is exhausted. The bandage, when thus applied, forms a double triangle—one appearing on the back, the other on the breast—and serves to retain the arm and shoulder in their elevated position. See *Plate X. fig. 2.*

The different turns or casts of the three rollers being firmly fastened to each other by numerous pins, it only remains to apply the sling, (made of a piece of common roller passed around the hand and wrist, and pinned above to one of the bandages,) and to cover the whole with the large muslin cloth. The last I have never employed, as the rollers have always remained sufficiently firm without.

The patient is relieved of pain from the moment the arm is secured by the second roller, and when the operation is finished is generally able to walk about without inconvenience. In a few days, however, the bandages become more or less relaxed or discomposed, and must be replaced. There are some surgeons, however, who object to the bandages of Desault, upon the ground chiefly of becoming loose, and seem extremely averse to a renewal of them, as if the trouble of replacing a dressing did not fall as much within their province as its original application. Others have expressed idle fears about excoriation, high inflammation, mortification, from the rollers being drawn with immoderate force. It is perhaps possible, (though I have never witnessed it,) if the bandages are put on in a slovenly manner, as they too often are, whether forcibly drawn or relaxed, and suffered to remain until they become foul, that excoriation may follow; and so it may from any other bandage or species of clothing. But it is the business of the surgeon to guard against such things, to lay his bandages smooth and flat, and to remove them as soon as they become loose, wrinkled or twisted. As to high inflammation and mortification ever having followed from Desault's bandage, the idea is irresistibly ridiculous and unworthy of serious refutation, and only proves that those who have advanced the assertion know very little, practically, about such matters. Indeed I have commonly observed, that the surgeons who are most loud in their condemnation, and extravagant in their assertions about these bandages, have never applied them, never had control of a public infirmary, where such accidents are commonly met with, and have enjoyed very limited opportunities in private practice. The only inconvenience that I have ever known to result from

the apparatus, has occurred from pressure on the large and flaccid mammæ of old and fat females; but this so rarely happens, that it can hardly be considered as an objection to the general practice. On the contrary, the simplicity of the apparatus, the facility of obtaining the materials of which it is composed, and its efficiency when properly applied, compared with the difficulty of procuring or fabricating machines made of straps and buckles, and quilted bands and bolsters, all of which must be made by regular workmen, and a separate machine adapted to the size of each individual, during which days may elapse while the patient is suffering, must in the eyes of every sensible and experienced person determine at once in favour of Desault's particular plan.

SECTION VII.

Fracture of the Scapula.

THE scapula, owing to its great mobility, is seldom fractured; though it is often contused, and sometimes so severely as to give rise to collections of matter between it and the chest. The acromion process and lower angle of the scapula are more frequently broken than any other parts. The coracoid process, owing to its retired situation, is scarcely ever injured.

Fracture of the acromion may be known by the change in the form of the shoulder, which is sunk and flattened—being drawn downwards by the weight of the arm and the action of the deltoid muscle—by the pain, crepitation and mobility of the acromion, which are readily produced by raising and depressing the arm.

The lower angle of the scapula, when fractured, is drawn forwards by the serratus anticus major, and is so completely insulated as to be easily distinguished by its inequality and unnatural position.

Longitudinal fractures of the scapula seldom occur, and are attended with little displacement, owing to the manner in which the muscles covering the surface of the bone are arranged.

Treatment of Fracture of the Scapula.

These accidents are usually accompanied with so much contusion, as to render the removal of the inflammation that follows an object of greater importance than the treatment of the fracture itself. So profuse in some instances has been the secretion of matter beneath the scapula, as to require the operation of the trephine for its evacuation; at least the scapula has been perforated with this view, although the proceeding has always appeared to me unnecessary, from a persuasion that the abscess under any circumstances might be reached by penetrating the soft parts on either edge of the bone.

Fracture of the acromion merely is easily reduced and secured by elevating the arm to its natural height, fixing a pad in the axilla by a roller around the body, and binding the arm to the pad by a second roller, after Desault's manner of treating the fractured clavicle.

When the lower angle has been separated from the body of the scapula, it is hardly possible to overcome the action of the serratus anticus muscle, so far as to restore the fragment to its former position; by a thick compress, however, placed in front of the fragment, and there retained by a roller passed around the chest, the arm being afterwards fixed by an additional roller or sling, the fractured portions may be made to approximate so closely as to leave little or no deformity. Sometimes the patient recovers sooner when confined to bed during the whole treatment.

SECTION VIII.

Fracture of the Arm.

THE humerus is very subject to fracture, and may be broken at any portion of its length—at its head, neck, middle, or condyles. By the term neck of the humerus is understood, among *surgical* writers, that portion intermediate to the tuberosities of the bone and the insertion of the pectoralis major and latissimus dorsi muscles.

Except in old subjects the *neck* of the humerus is not often fractured; but among these the accident is by no means uncommon. In young persons the epiphysis is sometimes separated from the shaft of the humerus. In either case the upper fragment is drawn outwards by the action of the subscapularis and teres minor, while the lower one is pulled inwards by the latissimus dorsi and pectoralis major. At the same time the weight of the arm, by keeping down the lower fragment, prevents it from overlapping the upper. Sometimes, though rarely, the lower fragment is forced outwards.

Fracture of the *head* of the humerus is occasionally met with, and arises for the most part from a violent force directly applied, or from a gun-shot wound. That portion of the bone articulated with the glenoid cavity, there is reason to believe, in all such cases, is either absorbed or changed in figure. Three or four well marked cases of the

kind are contained in my cabinet, in all which the head has lost its spherical form, is very much diminished and rough and flattened next to the scapula. Similar examples are recorded by different writers.

Fractures of the neck or head of the humerus have been confounded with luxation, and much mischief has sometimes followed the mistake. The accidents, however, are easily distinguished by any one familiar with the structure of the joints and the parts in its vicinity. When fractured, the head of the bone still remains in the glenoid cavity, and the rotundity of the shoulder is thereby preserved. In luxation a hollow may always be felt under the acromion, and a tumour, formed by the displaced head of the bone, distinctly perceived in the axilla. Besides these signs, which in general are sufficiently indicative of the nature of each case, more or less crepitation may always be perceived when the bone is fractured, but in luxation can never be observed.

The *middle* of the humerus is oftener fractured than any other part of the bone. A direct force, a counter-stroke, or muscular action may each produce the fracture, which, is usually oblique or transverse, and easily known by the mobility of the arm at the injured part, by the angular derangement, pain, crepitation, &c.

The *condyles* are frequently fractured by violence immediately applied to them. When both are broken, a longitudinal fissure commonly runs along the centre of the bone for some distance, and then terminates by a transverse or oblique division of the shaft of the humerus. When

one condyle only is separated, the direction of the fracture is necessarily oblique. These injuries are often followed by high inflammation, ankylosis, and deformity of the whole arm, and should therefore be carefully distinguished from other accidents to which the elbow joint is liable. Instances are mentioned by Sir Astley Cooper* in which the condyles were fractured just above the elbow joint, and presented appearances very similar to those produced by dislocation of the radius and ulna backwards. When both condyles are fractured, the deformity is greater than when one only is separated. In either case the crepitation is commonly very distinct upon impelling the fragments in opposite directions, and pressure upon the olecranon and bend of the arm increases the breadth of the elbow, which can only happen by the recession of the condyles from each other.

Treatment of Fracture of the Arm.

The most effectual plan I have ever tried for retaining in accurate apposition the fragments of the humerus, when fractured at its *head* or *neck*, is that described by Desault.

The patient being seated on a chair, an assistant takes hold of the hand of the sound side and makes counter-extension; another assistant grasps the forearm of the injured limb, which is previously placed in a semiflexed position,

* See A Treatise on Dislocations and on Fracture of the Joints, by Sir Astley Cooper, 4to. 1822, p. 480.

and makes extension, while the fingers of the surgeon are employed in adjusting the fragments. The surgeon next takes a roller six or eight yards long, and commencing at the palm of the hand carries it up the forearm and arm by circular and reversed turns as high as the shoulder, thence across the breast, around the shoulder and armpit of the sound side, then across the back to the injured shoulder, where it is held by an assistant until the surgeon places three strong splints, each two inches wide, and the length of the humerus, on the anterior, outer and posterior parts of the arm, and then resuming the roller, which is made to descend towards the elbow, secures them firmly to the limb—taking especial care to cover their extremities with tow or lint, to prevent inordinate pressure and excoriation.

Having proceeded thus far, the surgeon takes a pad, exactly similar to that used for the fractured clavicle, and placing the small end of it in the axilla, (if the lower fragment should be drawn outwards, and vice versa,) lays it along the arm, and secures it to the body and shoulder by the narrow strips attached to its corners and by pins. Then taking another roller somewhat longer than the one previously applied to the arm, and commencing at the armpit of the sound side he carries it to the injured arm and fastens it to the body and the pad, precisely after the manner of the second roller for fractured clavicle. The pad being fixed serves the purpose of a fourth splint for the arm, while it affords support to the fractured portion, upon which a common splint can have very little purchase. It only remains to suspend the forearm, which is fixed upon the breast in a sling, and to secure the different turns of the rollers by pins or stitches.

Fractures of the *middle* of the humerus are readily managed by a single roller, and by four splints of unequal length. The roller must commence at the hand, (a rule to be observed in all fractures of the arm and forearm,) and extend as high as the shoulder, where it is held by an assistant while the surgeon surrounds the arm with the splints, which are secured to the limb by the remainder of the roller carried towards the elbow and forearm. The hand and forearm are placed across the chest and sustained by a sling.

The *condyles*, when fractured, are best secured by a roller and two *angular* splints, a practice first suggested by Dr. Physick to obviate deformity,* which is extremely apt to follow all fractures about the elbow joint. The fracture being reduced and the forearm bent, a roller is applied in the usual way, and extends as high as the shoulder; the surgeon then takes the splints, (about two inches broad, long enough to extend from the shoulder to the elbow, and from the elbow two or three inches beyond the fingers, in shape somewhat resembling a workman's square,) and applies one on the outside, the other on the inside of the limb, and secures them by the remaining part of the roller. To prevent ankylosis, the dressings should be taken off frequently, and renewed after repeated but gentle flexion and extension of the joint. After two or three weeks the rectangular splints may be laid aside, and others substituted that are more obtuse in the angle.

* "The deformity alluded to consists in an *angular projection of the elbow outwards*. It is most evident when the whole arm is placed at right angles to the body, with the thumb upwards, the patient standing erect. In that case, instead of a gentle curve downwards at the elbow, which is natural, the curve is directly reversed." Dorsey's Surgery, edit. 3d. vol. i. p. 168.

SECTION IX.

Fracture of the Forearm.

THE radius and ulna may both be fractured at the same moment, opposite each other, or upon a different level. Usually the fracture occurs about the middle of the bones, and is either transverse or oblique, while the derangement is angular, or in the direction of the diameter of the bones.

The radius is oftener fractured than the ulna, because it is connected with the bones of the carpus, and therefore liable to receive directly any shock communicated to the hand. The fracture occurs near the wrist, at the middle, but rarely at the upper extremity of the bone. Receiving partial support from the ulna, which serves as a splint, the deformity is less than in fracture of both bones. By placing a finger upon the upper extremity of the radius, while the lower part is made to turn on its axis by moving the hand, the superior fragment, if fractured, will remain stationary; but, on the contrary if entire it will move with the rest of the bone, and afford very conclusive evidence of the nature of the case.

Fracture of the *ulna*, commonly occurs towards the lower or smaller extremity of the bone, sometimes about the middle, but seldom at the upper extremity. The accident is easily known by the crepitation, deformity and mo-

bility of the lower fragment, when the separation takes place below the elbow.

The *olecranon*, which constitutes the summit of the ulna, may be fractured by direct violence or by the inordinate action of the triceps muscle. The former is the most frequent cause, and is generally produced by a fall, in which the patient catches upon the elbow in the act of saving the body. As soon as the fracture occurs, the process is drawn upwards by the triceps, and separated a greater or less distance from the shaft of the bone. The space thus produced is increased upon bending the forearm, and diminished by extending it—signs so perfectly decisive of the character of the fracture as generally to render other evidence unnecessary. Sometimes, however, the tumefaction around the joint is so considerable as to prevent satisfactory examination, at least for several days.

The *coronoid* process is sometimes fractured. One instance of the kind occurred to Dr. Physick, and two others are mentioned by Sir Astley Cooper.

Treatment of Fracture of the Forearm.

With the exception of the olecranon, fractures of the bones of the forearm should be treated upon the same principle. Whether one or both bones be broken, the limb is placed in the bent position, and counter-extension made by an assistant, who grasps the arm above the condyles; another assistant keeps up extension by pulling at the

hand, and the fingers of the surgeon are employed in compressing the muscles situated between the bones, in order to force the fragments outwards or in a lateral direction, and thereby prevent them from encroaching upon the interosseous space. Having restored by these means the natural form of the limb, the surgeon applies two graduated compresses, (about three inches wide, the length of the hand and forearm, and half an inch thick at the base,) one on the anterior, the other on the posterior part of the forearm and hand—the base of each being placed downwards. These compresses are secured by a roller, commencing as usual at the hand and extending a short distance above the elbow. Over this are placed two splints, equal in length and breadth to the compresses, one in front, the other on the back of the limb, to which they are fastened by the remaining part of the roller. The compresses serve the double purpose of rendering the limb throughout of uniform thickness, and of creating pressure upon the muscles between the interosseous space. Two splints are quite sufficient to keep the bones firm; indeed, additional ones, by making lateral pressure, would prove injurious, and counteract the design of the compresses. The splints in every instance should extend to the extremities of the fingers and afford complete support to the hand, otherwise deformity will ensue from the radius crossing the ulna and following the movements of the hand. This mode of treatment, without variation, will answer extremely well either for the radius or ulna individually, or for fracture of both bones.

Fracture of the *olecranon* requires a very different management, and is not so easily secured. Instead of flexing

the forearm, which would tend to separate widely the fragments, it is placed in the extended position, and there retained, while a roller, several yards long and three inches wide, is applied by circular and reversed turns as high as the elbow, when it is given to an assistant until the surgeon draws down with his fingers the fragment of olecranon attached to the triceps, and brings it in contact with the lower fragment; the roller being then resumed, is passed obliquely by several successive turns around the joint and above the insertion of the triceps, in form of the figure 8; thence it is continued by circular turns up the arm, and made to compress the muscles firmly. The bend of the arm is next filled with lint or tow, and over this is placed a firm splint, long enough to extend from the middle of the arm to the same distance on the forearm. This splint is completely covered by the roller, and serves to preserve the extended position and to ensure the contact of the fragments.

When properly managed, the fractured olecranon unites in a much shorter time and with less deformity than is commonly imagined. Under any circumstances, however, it is difficult, owing to the incessant action of the triceps and the little purchase offered by the olecranon to act upon, to preserve the fragments so closely together as to bring about ossific reunion; instead of which a ligamentous substance, abundant in proportion to the space between the fragments, is secreted, and forms the connecting medium. Owing to this, the arm long remains weak, and sometimes never recovers its former strength.

When the *coronoid* process is fractured, there will be a

constant tendency to displacement of the ulna backwards, so that the accident resembles luxation of the bones of the forearm posteriorly. By pulling the forearm, however, and at the same time bending it, the deformity is removed, but quickly returns unless prevented. The best mode of treating the injury is to preserve the limb in the flexed position for several weeks

SECTION X.

Fracture of the Hand and Fingers.

THE bones composing the *carpus* or wrist are so compact and firmly united to each other, as to resist effectually any common force applied to them; they are sometimes broken, however, by great and direct violence, in which case the soft parts suffer in proportion.

The *metacarpus* is sometimes fractured by a force immediately applied, but seldom in any other way. In two or three instances I have known these bones very much shattered by the bursting of a gun, while the patients were grasping the barrel with their left hand. In one case a very fine youth* lost his life from carelessly crossing his hands over the muzzle of his piece, and resting one foot on the lock; by which the cock was pushed back, the gun discharged, and the contents driven through both hands, tearing up the metacarpal bones in a shocking manner, and producing tetanus in a few days.

The *fingers* are sometimes broken by machinery, mashed by heavy weights, or caught within the fold of a door. In such cases they may be fractured in several places, dreadfully bruised, or nearly divided. When simply broken, without much injury of the soft parts, the accident is com-

* The son of G. W. Esq. of Baltimore.

paratively trivial, and easily distinguished by the deformity, crepitation, &c.

Treatment of Fracture of the Hand and Fingers.

When the carpal and metacarpal bones have sustained serious injury, we have more cause to dread the effects of inflammation, than any mischief that may result from the fracture merely. Frequently the necessity of amputation is clearly indicated; at other times an attempt to save the hand or a part of it must be made.

The fingers, when simply broken, should be surrounded with a narrow roller, and sustained by four splints made of binders' boards, two of which should extend as high as the wrist, and the others the length of the finger merely.

Fingers that have been very much lacerated, nearly separated, or hanging by shreds, should always be replaced, and reunion attempted; for it has happened, as in the cases formerly referred to and detailed by Balfour, that adhesion has been accomplished even after the total separation of one or more phalanges.

SECTION XI.

Fracture of the Pelvis.

THE bones of the pelvis are rarely fractured, owing to their great strength and the unyielding texture of the ligaments by which they are tied together. Such injuries, when they do occur, are always the result of great violence, and on this account usually have an unfavourable termination.

Of the individual bones, the *innominatum* is perhaps most liable to fracture, and commonly from force directly applied, as when a patient is squeezed against a wall or post by the wheel of a cart, or by the passage of the wheel of a wagon heavily laden over the hips while lying on the ground. In such cases both bones are generally crushed inwards.

The *sacrum* may be fractured, or severely contused, by falls from a height upon the buttocks, from which more or less concussion results, or injury to the sacral nerves. But the most formidable accident is fracture of the *innominatum* combined with that of the *acetabulum*, especially when the bones separate so far as to allow the head of the femur to enter the pelvis; in which case the thigh is shortened, and the disease may be mistaken for luxation. It can be distinguished from it, however, by the crepitation produced by moving the fragments in opposite directions, and by the eversion of the foot.

The *os coccygis* is sometimes fractured in old subjects, but seldom in young ones, owing, in the latter, to the great mobility of the bone.

In all cases where the shocks communicated to the pelvis are violent, whether the bones be fractured or not, symptoms resembling those from injuries of the vertebræ are apt to arise—such as paralysis of the extremities, incontinence or suppression of urine, &c.

Treatment of Fracture of the Pelvis.

No benefit will result in these cases from splints and bandages, and the treatment should be chiefly directed towards the removal of inflammation, which is best accomplished by copious depletion, low diet and perfect rest. In addition, the catheter, if required, must be used two or three times a day, and care taken, by the application of adhesive plasters to the parts that sustain the greatest pressure, to prevent ulceration and sloughing.

SECTION XII.

Fracture of the Patella.

MUSCULAR action is the most common cause of fracture of the patella; hence the accident usually occurs amongst dancing masters, circus riders, and persons much accustomed to the exercise of leaping. The bone may be broken, also, by force directly applied to it, especially if the knee be bent at the time the injury is received; in which case the centre of the patella, being unsupported by the heads of the femur and tibia, is the more apt to give way. From whatever cause the accident proceed, the direction may be transverse, oblique, or longitudinal.

The *transverse* fracture, however, is infinitely more common than the rest, and easily known by the upper half of the patella being mounted upon the anterior part of the thigh four or five inches above its natural position, being drawn thither by the combined action of the rectus, cruræus, and vasti muscles. Besides this sign, which is very unequivocal, a manifest hollow can always be felt and seen at the knee, into which the fingers may be pressed as far as the integuments will allow; the patient, moreover, falls to the ground, is unable to rise without assistance, cannot walk, and is generally sensible at the moment of the fracture of an audible noise or smart report.

When the fracture is *longitudinal*, none of these symp-

toms exist, because the fragments still retain their position, or at least can only be made to separate from each other laterally, or in the direction of the breadth of the knee.

Compound and complicated fractures of the patella fortunately are not very frequent: they are always attended with immense risk, and may terminate fatally or in incurable lameness.

The patella, when once fractured, ever after remains comparatively weak, and is very prone to a recurrence of the injury. This arises from the difficulty, perhaps impossibility, of maintaining the fragments of a transverse fracture in *exact* apposition: bony matter is therefore not secreted in sufficient quantity to fill up the vacuity, and its place is supplied by a ligamentous substance, which for a long time after the accident continues soft, and is easily torn. It is true, that bony matter has been found on dissection; but instances of the kind are so extremely rare as not to affect the general position—that the bond of reunion, except in longitudinal fractures, is ligamentous. This has, moreover, been confirmed by the experiments of Sir Astley Cooper and others on inferior animals.

A fracture of the patella in one limb is very apt to be followed by a similar injury in the other—owing perhaps to the sound limb sustaining, for a long time after the first accident, more than its proportion of the weight of the body and performing a greater variety of offices.

Treatment of Fracture of the Patella.

Various means have been employed to overcome the action of the extensor muscles and retain the fragments together; but the plan devised by Desault I have always found the most simple and effectual.

A splint two inches wide, long enough to extend from the tuberosity of the ischium to a short distance above the heel—two rollers, each six yards long and three inches wide—another roller or compress, somewhat longer than the thigh and leg, are the materials of which the apparatus consists. The thigh being bent on the pelvis, and the leg extended on the thigh, is supported by an assistant at a considerable elevation, whilst another assistant stands at the pelvis and keeps it fixed. The surgeon then takes the short roller or compress, and extending it on the anterior part of the whole limb, gives an end to each of the assistants who keep it tense. One of the long rollers is next passed around the instep by two or three circular turns, so as to enclose and secure the end of the compress, and is then passed by reversed and circular turns as high as the knee, when it is given in charge to the assistant who stands at the pelvis. The surgeon now makes two longitudinal slits with a penknife or scissors in the compress, corresponding with the situation of the knee pan; through each of these a finger is introduced, and the patella drawn down and placed in contact with its lower portion; the roller is then resumed and carried around the joint, above and below both fragments, several times in form of the figure 8. These oblique turns being crossed by circular ones, the roller is

continued up the thigh and terminates by fixing securely the upper extremity of the compress. The use of the compress, it will now be seen, is to prevent on the one hand the casts of the roller on the leg from slipping downwards, and on the other those applied to the thigh from ascending by the action of the extensor muscles.

The limb being still sustained in its elevated position by the assistant standing at the foot, the surgeon next takes the splint, and placing one end under the ischium lays it beneath the thigh, leg and heel, then filling up the inequalities of the limb with lint or tow, and padding the parts well, with either of these materials, upon which the greatest pressure is made by the splint, the remaining long roller is passed, commencing at the ankle, around the splint and limb, connecting the one firmly to the other throughout their whole extent. It only remains to retain the limb in its elevated situation. This is easily accomplished by forming an inclined plane, composed of pillows, the highest part of which is placed at the heel.

Whenever the bandage becomes relaxed, which it generally does in six or eight days, it must be reapplied. The inclined plane should be examined daily, and never suffered to sink beyond the level at which it was first placed. In sixty or seventy days the fragments are usually consolidated; but the patient should be very careful not to try, for a long time, the strength of the limb, or to exert more force upon it than the intermediate ligamentous substance may be able to bear.

SECTION XIII.

Fracture of the Thigh.

THE *os femoris* being very long, somewhat curved, and surrounded by powerful muscles, is frequently fractured. The fracture may take place at the head, neck, shaft and condyles of the bone, either in a transverse or oblique direction. Compound and complicated fractures of the femur may also occur, though such accidents are comparatively rare.

Fracture of the *neck* of the femur may happen within the capsular ligament or exterior to it. The former is most common, and met with almost exclusively in very old subjects; the latter may occur at any period of life. Women, moreover, are more liable to fractures of the neck of the bone than men, from what cause is not exactly known. It seldom happens that the neck of the *os femoris* is broken by a direct force. A counter-stroke or a twist of the limb, are the most frequent causes of it. Thus, a fall upon the trochanter or upon the feet, by which an impulse is communicated to the bone, will often fracture it obliquely or transversely. The latter direction is most common. A very slight twist of the pelvis or thigh in an old subject will sometimes be sufficient to break the neck within the capsule. I have known it happen from the patient's attempting suddenly to turn round, while the foot remained fixed by some slight irregularity on the floor.

The *signs* of this fracture are in general very evident. Instead of retaining its natural length, the limb is drawn upwards, the shaft of the bone lodged on the ilium, the foot turned outwards, and the trochanter major inclined backwards. In addition, the limb can be restored without difficulty to its natural length, but reascends as soon as the extension is discontinued; again—upon rotating the thigh on its axis, whilst a hand is laid upon the trochanter, this projection will be found to turn, as it were, upon a pivot, whereas in the entire state of the bone, it describes the arch of a circle, the radius of which is formed by the neck of the femur. Other signs have been enumerated; but these, taken collectively, will generally prove sufficient to indicate the nature of the injury.

The *prognosis*, as respects reunion of the fragments after fracture of the neck of the femur within the capsular ligament, is as unfavourable as can well be imagined. Scarcely, indeed, is it possible to find on record a well attested example of perfect *bony* reunion after such an accident. It is true that many alleged specimens of the kind have been brought forward, especially of late years, but few if any have been able to stand the test of rigid scrutiny, and upon examination have turned out to be fractures of the neck of the bone on the outer side of the capsular ligament. Although reunion is never accomplished, however, in some subjects, especially very old and infirm ones, and the fragments remain for ever insulated, it must not be inferred that this invariably happens; for even under the greatest disadvantages, nature always makes an effort towards reparation, and often succeeds so far as to effect a ligamentous reunion similar in some respects to that which

occurs in fracture of the patella and olecranon. Still the joint remains weak, imperfect and deformed, and never able afterwards to sustain the full weight of the body or to encounter shocks which originally it was accustomed to bear with impunity. This imperfect reproduction may be owing to two or three different causes—to the portion of bone connected with the acetabulum being deprived of its vascularity or nutriment by the rupture of the periosteum and reflected membrane of the cervix femoris, upon which it chiefly depends for its supply of blood; the quantity which it receives through the medium of the round ligament, and upon which it must now mainly depend, not being sufficient for its support—to a wide separation of the fragments, from muscular action or want of appropriate means to keep them in apposition—and to a copious secretion or accumulation of a serous fluid within the capsule of the joint, which by its interposition and circumfusion effectually cuts off all interchange or connexion between the separated fragments.

As already remarked, fracture of the neck of the femur may take place exteriorly to the capsular ligament; in this case the diagnostic marks do not differ materially from those pointed out as belonging to fracture of the same bone within the capsule; the result, however, both as respects the deformity and utility of the limb, is very different, for in fracture on the outside of the capsule perfect bony reunion, from a full vascular supply, is soon established, and the limb becomes as strong as ever.

Fracture of the *trochanter major* alone, sometimes occurs. In this case, the shaft of the femur remaining entire,

no shortening takes place. The accident may be known by the mobility of the trochanter, and by its being drawn upwards or towards the ilium.

The *middle* of the os femoris, in young subjects, is perhaps more liable to fracture than any other portion of the bone. This arises from its exposed situation, and to its being more under the influence of muscular action. There will be an essential difference in the nature of the accident, especially as regards the result of the treatment according to the direction of the fracture. If there be a transverse fracture, the ends being fairly supported against each other, little or no deformity will ensue. If the fracture be oblique, the ends overlap, and the inferior fragment is generally drawn for several inches upon the posterior surface of the upper fragment, and hence a shortening of the limb, followed by all those difficulties which have been complained of from time immemorial. The higher, however, the fracture is situated upon the shaft of the bone, the greater will be the overlapping, because a greater number of muscular fibres will be employed in producing the retraction. The signs indicative of fracture of the middle of the bone, correspond in most respects with those of fracture of its neck.

Like the *condyles* of the os humeri, those of the femur may both be broken, or only one. In the former case, crepitation, together with shortening of the limb and a facility of increasing the breadth of the knee by pressing upon the patella, will be sufficient to distinguish the accident from any other affection. Compound fracture of the femur just above the condyles, especially when the fracture is oblique and the superior fragment penetrates the

rectus muscle, should always be considered a very grievous accident, and liable to terminate in death or amputation.

Treatment of Fracture of the Thigh.

Had the surgeon no other difficulties to encounter than such as present themselves after simple transverse fracture of the shaft of the thigh bone, he would have little reason to complain of the defectiveness of art, or of the power of nature in promoting a cure. So different, however, from this is the result of an oblique fracture of the body of the bone or of a transverse fracture of its neck, that it is hardly possible in any case to calculate with certainty upon reunion without more or less shortening and deformity of the limb. The remark will apply most forcibly to fracture of the cervix femoris within the capsule, and the surgeon should be careful in such cases how he ventures to promise a favourable result, especially in very old subjects. Indeed, as respects these cases, I have strong doubts of the propriety of attempting more for the relief of the patient, than merely keeping him as quiet and easy as possible, by supporting the hips with pillows and retaining the limb as much in the extended position as can be borne. If extension and counter-extension, however, should be deemed admissible, then recourse must be had, I conceive, not to the means commonly employed, but to others I shall presently point out.

Without recounting the various contrivances that have been used at different periods for effecting extension and

counter-extension, most of which are detailed at length in the different works written expressly on fractures, I shall merely speak of the means which have commonly been employed in this country within the last twenty or thirty years, and of such recent European and American inventions as may appear deserving of notice.

The celebrated Desault, it is well known, employed an apparatus consisting of a strong splint, long enough to reach from the spine of the ilium to four inches beyond the foot; of another splint, extending from the perinæum to the sole of the foot; of a third, the length of the thigh itself. To these were added extending and counter-extending bands, junks or long narrow bags filled with chaff, the bandage of Scultetus, a splint cloth, &c. The whole being arranged, extension was made from the foot by passing the band around the ancle, and fixing it to the lower end of the long splint, counter-extension from the perinæum, securing the end of the band to the upper extremity of the splint.

Dr. Physick, having in several instances tried the apparatus of Desault, found it defective, chiefly on account of the obliquity of the action of the counter-extending band, which, owing to the splint not extending above the spine of the ilium, passed across the upper fragment of the femur and forced it outwards. Again—the extending band, by pulling the foot outwards and pressing it against the lower extremity of the splint, sometimes occasioned troublesome excoriation. To obviate these inconveniences, Dr. Physick modified the apparatus in the following way. The long external splint, instead of terminating at the hip, was made to ascend as high as the armpit, where its extremity was

formed like the head of a crutch, and padded to take off pressure from the axilla. Immediately below the crutch-like head of the splint, a hole or mortise was made, sufficiently large to admit the end of a handkerchief or counter-extending band. The lower end of the splint, at the suggestion of Dr. Physick, was altered by Dr. James Hutchinson, then a student at the Pennsylvania Hospital. The alteration consisted merely in attaching to the splint, a little above its lower end, a small block, which, projecting inwards at a right angle with the splint, and being notched at its extremity, served to receive the extending band, and by diverting it inwards, to prevent excoriation of the external parts of the foot, and to keep up extension precisely in the direction of the limb.

Previous to the application of the apparatus thus modified, a common bedstead, between two and three feet wide, the bottom of which is covered with wooden slats instead of a sacking bottom, is selected; over this is placed a firm and even mattress, a sheet above it, and a pillow for the patient's head. Commencing about the middle of the mattress, five or six pieces of broad tape, a yard in length, are laid upon the sheet transversely, and placed eight or ten inches from each other. Next a *splint cloth*, or piece of muslin, a yard and a half long and a yard wide, is placed above the tapes—its longest diameter running parallel with them. Over the middle of the splint cloth, near its upper edge, is then laid, longitudinally with respect to the mattress, a splint of binders' boards, two inches broad, nine long, and above and across the splint the bandage of Scultetus. This is made of a common roller two or three inches wide, divided into strips long enough to surround the thigh

and overlap. The first strip is laid near the upper edge of the splint cloth; the second overlaps about an inch and a half, and the others are similarly arranged and in regular succession, until a sufficient number are laid down to equal the length of the thigh. Two bags, filled with chaff or cut straw, extending from the hip to the foot, and four inches wide, are then prepared. Lastly, three silk or madrass handkerchiefs, each about a yard long, previously washed and folded diagonally, and the three wooden splints—the long external one, the internal one reaching from the perinæum to the foot, and the short one the length of the thigh, are all placed within the surgeon's reach.

Every arrangement being made, the patient is placed on the bed by careful assistants, and the injured thigh, (previously stripped of every species of clothing,) laid in the centre of the dressings without disturbing them in the slightest degree. One of the handkerchiefs is then passed around the ancle and instep of the injured limb, somewhat in the form of the figure 8, knotted under the sole of the foot, and its ends given to an assistant; another is carried along the perinæum, between the genitals and thigh, and its ends, which pass above the pelvis before and behind, delivered to a second assistant. By these extension and counter-extension are next made, while the surgeon, after having adjusted the fragments and restored the natural shape of the limb, applies the bandage of Scultetus by commencing at the strip last laid down or that nearest the knee. The ends of this are brought over the front of the thigh and crossed; a second strip secures the first, and in like manner all are made to overlap until the whole thigh is covered, when the last strip is fastened by a pin. The two

long splints are next rolled in the splint cloth, and, thus covered, are brought alongside the limb, leaving a space merely sufficient for the interposition of the bags of chaff, which are then applied, and serve to fill up inequalities and to prevent the splints from irritating the thigh and leg. Now the extending and counter-extending bands are fixed by the assistants in their respective places—one being carried around the notched extremity of the projecting block situated near the end of the external splint and tied to a mortise below it, the other drawn nearly in a line with the body and secured to the mortise at the upper end of the splint. The short splint being laid over the front of the thigh, and the third handkerchief passed around the external splint and the pelvis, the tapes are all drawn around the limb and splints, and tied, and the operation finished.

A mode of securing the fractured thigh, very different from that of Desault, I have latterly practised. This consists in extending the patient's limbs upon a mattress, and confining both feet by gaiters or handkerchiefs to a foot-board, which is firmly supported by the ends of two splints passed through mortises near its edges. These splints extend from the armpit, where they are padded like the head of a crutch, along each side of the body, thigh and leg, beyond the foot, and being well stuffed on their inner surfaces to prevent irritation, are confined by six or eight broad tapes or bandages passed around the limbs, pelvis, chest, &c. *See Plate XI.*

The principle upon which extension and counter-extension are effected by this contrivance, will instantly be understood. The sound limb being extended, serves as a



Fig. 1.

splint to the broken one. Counter-extension then is made upon the *acetabulum of the sound side*, and extension upon the ancle of the injured limb, which, so long as the two feet are kept upon the same level, cannot be shortened, provided rotation of the pelvis be prevented. This purpose is answered by extending the splints to the armpit on each side, and not with a view, as might be supposed, of producing counter-extension from these points. The principle upon which this apparatus acts was first suggested by Brunninghausen, and afterwards revived by Hagedorn, upon whose particular contrivance for effecting extension and counter-extension, the one I have just described is designed as an improvement. Finding, upon trial, that the patient in the original machine of Hagedorn,* (which consists of a single splint merely and footboard, independently of leather straps, &c.) could incline the pelvis towards the affected side, and thereby shorten the limb, by causing the superior fragment to descend and overlap the inferior, the additional splint was added, and has been found to answer completely the end designed.† The apparatus, modified in the manner I have described, has been used by different practitioners in the United States, and with perfect success. Dr. Faures of this city succeeded in restoring to its original length, by means of it, a limb shortened three inches, and after it had remained three weeks in the splints of Desault. Cures have also been effected, in the most satisfactory manner, by Dr. Lott, of Jersey, and by Dr. C. Cocke, of Virginia. As I am informed also by two intelligent students

* For a full account of Hagedorn's apparatus, see *First Lines of the Practice of Surgery*, by S. Cooper, vol. ii. p. 430. edit. by Stevens.

† See *Chapman's Journal*, No. 6, p. 231.

—Messrs. Stone and Willis—their preceptor, Dr. Brown, an accomplished physician of Fredericksburg, Virginia, has effected in his own person a very perfect cure of an oblique fracture of the thigh bone by the same means.* Dr. Corson of New Hope, informs me that in a very difficult case of fractured thigh, attended with great deformity and shortening of the limb, he lately succeeded in producing a complete cure, by the apparatus above described.

* The following communication I have received from Mr. Thomas, a very diligent and respectable student from North Carolina.

“A boy, the property of Mr. D. aged about fourteen years, in driving a loaded wagon was thrown from his horse, and one or two of the wheels passing over his thigh, fractured it near the middle. Dr. Tuck, an eminent practitioner near Halifax Court House, Virginia, was immediately called, and applied the apparatus of Desault, by which a cure was effected in seven weeks. Mr. D. then sent for his boy and conveyed him home, a distance of forty miles. The night after his arrival, the boy, while standing, turned his body suddenly round, and again fractured the thigh. Drs. Thomas and Garland were then called in, and applied Dr. Gibson’s apparatus, and in seven weeks a perfect cure was effected, without any deformity whatever. The boy states that he did not experience half so much inconvenience from this as from Desault’s splint.”

Milton, North Carolina.

SECTION XIV.

Fracture of the Leg and Foot.

THE bones of the leg are susceptible of every variety of fracture, and may be broken at any place intermediate to the knee and ankle. Oblique and transverse fractures, however, about the middle of the limb, are most common. When both bones are fractured at the same time, there is commonly an angular derangement together with evident crepitation, and by these signs the nature of the accident is rendered very plain. But a longitudinal displacement sometimes occurs, in which case the bones overlap and produce a shortening of the limb. If only one bone be broken, the other serves as a splint, and prevents in a measure deformity, though it cannot obviate the crepitation, and by this sign the character of the accident is evinced.

Although the fibula is exceedingly weak and slender, and apparently contributes very little to the strength of the leg, yet when broken near its lower end, deformity and permanent lameness are extremely apt to follow, unless the case be well understood and managed with adroitness. The lower part of the fibula in fact forms the external boundary to the ankle joint, and serves mainly to preserve the foot in its natural situation. As soon, therefore, as fracture of the bone takes place just above the ankle, the lower extremity of it is forced outwards by the abduction of the foot, while its upper portion, or that which is in contact

with the upper fragment or shaft of the fibula, is directed inwards in an angular direction. Hence the astragalus may be thrown from the tibia, the foot drawn to the outside of the leg, and great deformity ensue. Fractures of the middle, or of the upper extremity of the fibula, are comparatively unimportant.

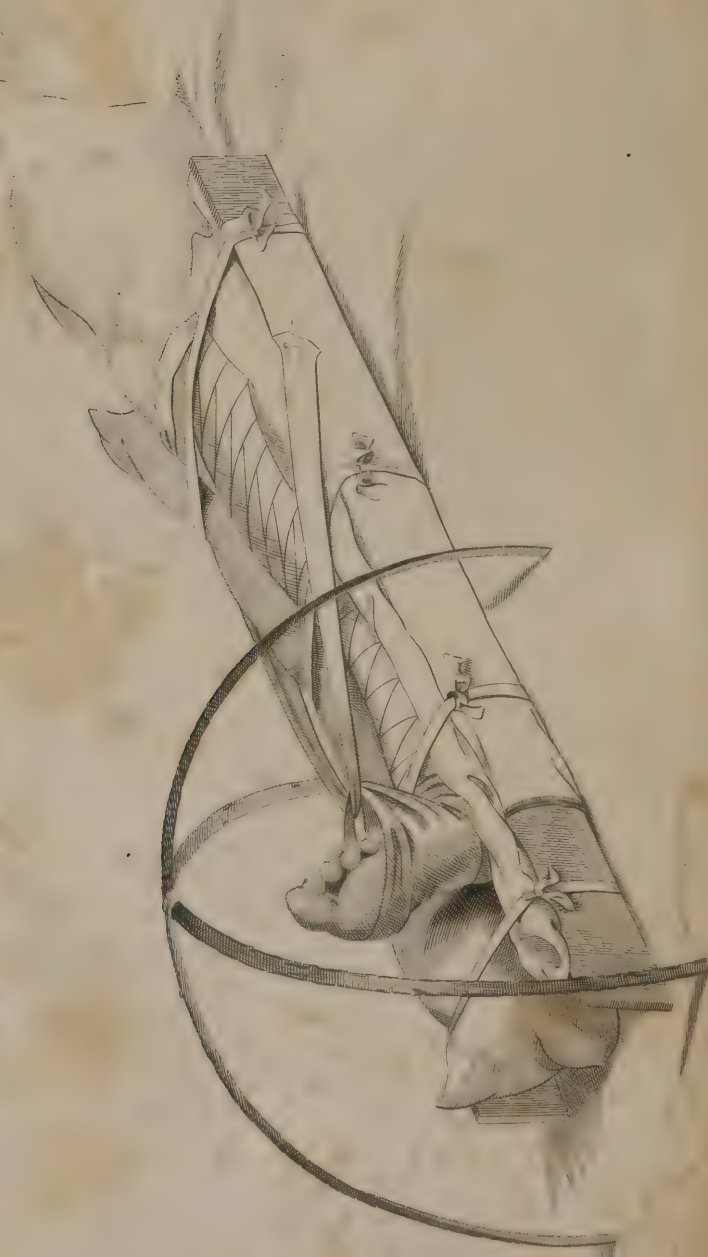
The *os calcis*, from its great thickness and strength, is seldom fractured, except by great violence conjoined with inordinate action of the extensor muscles. A fall from a height, by which the patient lights on the heels, is the most common cause of it. Upon examination, the extremity of the bone will be found separated from its body and drawn upwards on the posterior surface of the leg, where it forms a distinct tumour. By this sign the nature of the case will be clearly manifested.

The remaining bones of the foot may be comminuted by great violence directly applied to them, but are hardly susceptible of any other species of fracture. Like similar injuries of the hand, they are chiefly dangerous from the inflammation that follows.

Treatment of Fracture of the Leg and Foot.

Simple fractures of one or both bones of the leg may all be treated upon the same principle—with the exception of fracture of the fibula immediately above the ankle.

My own plan of managing these accidents is the follow-



ing. A mattress should first be prepared as directed for fracture of the thigh. Over the sheet which covers it five or six pieces of tape are laid; above the tapes a splint cloth, a yard and a half long and eighteen inches wide; next to the splint cloth a small firm pillow, covered by its case, and on the pillow the bandage of Scultetus, comprising a sufficient number of strips to reach from the ankle to the knee. Four or five assistants then take hold of the patient, and lifting him upon the mattress, place the limb on the pillow in the centre of the dressings. Extension and counter-extension are next made from the foot and knee, the fragments properly replaced, and the bandage of Scultetus applied. Two wooden splints, somewhat longer than the leg, half an inch thick and three inches wide, are then rolled in the splint cloth and folded closely against the pillow, so as to elevate its sides and cause it to fit the limb with the utmost accuracy; after which the tapes are tied over the edges of the splints, and the whole secured. To support the foot and keep it steadily fixed, the centre of a piece of roller, about a yard long, should be placed on the sole, the ends crossed on the instep, and pinned above on each side to the splint cloth. Lastly, two segments of a common barrel hoop are crossed at the centre and tied, and their ends placed upon the mattress over the foot and dressings, to take off the weight of the bed clothes. *See Plate XIII.*

When the bones pass each other and the limb is shortened, which very seldom occurs, it may become necessary to keep up extension and counter-extension by some apparatus. That employed by Dr. Hutchinson will be found the most convenient. It consists of two firm splints, long

enough to extend from the knee several inches beyond the foot. The upper end of each splint has four small holes in it for the passage of tapes, and the lower a mortise, intended to receive a bar eight inches long. The bandage of Scultetus being applied and the leg laid on a pillow, two tapes are placed on each side of the leg and parallel with it immediately below the knee, and are secured by a roller passed several times around the limb. Through the holes in the splints the ends of these tapes are next passed, and tied on the outside. Around the ankle, in the form of the figure 8, a silk handkerchief is placed, and the ends secured to the bar, which is previously passed through the mortises at the lower ends of the splint. By the tapes and roller counter-extension is produced, and by the handkerchief extension.*

Should fracture of the *fibula* take place near its lower end, accompanied by distortion of the foot outwards, the method proposed by Dupuytren will be found the most effectual. Two rollers, a cushion or pad, and a splint, constitute the means by which reduction is accomplished and maintained. The cushion, made of old linen or any similar material, must be two feet six inches long, five inches broad and four thick; the splint two feet, and the rollers each five yards in length. The cushion being doubled and formed into the shape of a wedge, is laid along the internal surface of the leg, with its thick end downwards, and should extend from the upper end of the tibia to the ankle. Over the cushion the splint is laid so as to project four or five inches beyond the foot; one of the rollers is then passed

* A representation of this apparatus may be seen in Dorsey's Surgery, vol. i. p. 207. edit. 3d.

around the cushion and splint immediately below the knee, and extended down the leg as far as the ancle. A space of several inches will thus be left between the foot and splint, which must be filled up by drawing the one to the other with the remaining roller, passed over the instep and heel in form of the figure 8. It must be obvious that, in proportion as the lower fragment of the fibula is drawn downwards and inwards along with the foot, the upper end must be carried outwards or recede from the tibia and resume its natural situation.

To replace the fractured *os calcis*, the surgeon bends the thigh on the pelvis, the leg on the thigh, and extends the foot on the leg. The superior fragment is then drawn downwards, and by an assistant retained in contact with the inferior, while the surgeon lays one end of a compress or short roller on the instep, carries it over the toes, under the sole of the foot and heel, along the posterior surface of the whole limb, as high as the pelvis, where it is held tense by another assistant. He then takes a common roller eight or ten yards long, and passing it around the foot by two or three circular turns, secures the end of the compress; after which the roller is carried about the *os calcis* and foot several times in form of the figure 8, thence passes up the leg and thigh by reversed and circular turns, and terminates at the hip, where it is fixed to the upper end of the compress. It only remains to preserve the limb in the position first given to it, and this is easily accomplished by placing three or four pillows under the ham, in the form of a double inclined plane.

SECTION XV.

Compound Fracture.

A wound communicating with the cavity of a broken bone, in which sense the term compound fracture is generally understood, may be produced by external violence, or by the protrusion of the bone itself. In the latter case, the bone is usually broken in a very oblique direction, though it sometimes happens that a very obtuse fragment will penetrate the integuments and produce an extensive wound. The bones are all liable to compound fracture, but the long or cylindrical ones, especially those of the leg, are most apt to suffer. Unless combined with other injury, the mere protrusion of the bone does not necessarily increase the danger of the case, for it often happens that the wound heals by the first intention immediately after the fragments are replaced.

A *complicated* fracture is not necessarily accompanied by an external wound or a protruded bone, and in this respect, among others, differs from a compound fracture. An open wound, however, conjoined with a luxation or with a lacerated artery, will generally exasperate all the symptoms, which at any rate are always liable to terminate most unfavourably.

Treatment of Compound Fracture.

The treatment of compound fracture must be regulated by the extent of the injury, and by the age, constitution and habits of the patient. If the external wound is slight and the hemorrhage inconsiderable, it will be sufficient to replace the bones and apply the dressings for simple fracture—merely covering the wound with a piece of lint or adhesive plaster. On the contrary, when the bones have been extensively shattered and their ends project several inches beyond the wound, whilst the surrounding soft parts are lacerated and mangled, and blood is streaming from the limb, a very different course should be pursued. To replace the bones under these circumstances will sometimes be found very difficult; but the surgeon should always make the attempt before he ventures to dilate the wound or saw off the bones. By well directed and gentle efforts at extension and counter-extension, the fragments may often be restored to their places; if these fail, then the soft parts which appear to bind the bones and prevent them from yielding may be slightly divided, and other trials by extension made. Should every endeavour of the kind prove fruitless, there can be no other resource than to cut off the bone, though it must be obvious that such an operation can very seldom prove necessary, and must always be attended with disadvantage, inasmuch as the limb will probably remain shortened or months elapse before the bone is regenerated. After the bones are replaced, it generally happens that the hemorrhage stops; should the blood, however, continue to flow copiously, it may be necessary to dilate the wound and search for the vessel.

which must be secured by the ligature or compress. Instead of confining the limb by splints and rollers, it should be placed on a pillow and surrounded lightly with the bandage of Scultetus, and every care taken to obviate and remove inflammation. After this has subsided and the wound begun to heal, splints and the usual dressings may be applied. When old, debilitated, and intemperate patients suffer from compound fractures, mortification may ensue. Such patients generally require a nutritive diet, bark, wine, &c.

Complicated fractures not unfrequently terminate in death or render amputation necessary. Under favourable circumstances the treatment does not differ from that of compound fracture.

SECTION XVI.

Pseudo-Arthrosis, or Artificial Joint.

WHEN the extremities of a fractured bone, instead of uniting through the medium of callus, remain loose and unconnected, a kind of false articulation is established and the limb is rendered nearly useless. This disease may follow a fracture of any bone, though it has been most frequently observed in the humerus. It may arise from premature use of the limb; from the interposition of a tendon, ligament, or muscle, from old age, certain peculiarities of constitution, disease in the osseous system, or from want of proper contact between the fragments. Reunion having been prevented by any of these means, the extremities of the bone generally become smooth and round, and are covered with a cellular or ligamentous substance. Sometimes a ball and socket are formed, and the ends of the bone roll upon each other. Two specimens of the kind are contained in my cabinet.

Treatment of Artificial Joint.

IN old subjects and in peculiar constitutions callus is sometimes secreted very slowly, and months elapse before reunion is perfected. Aware of this, the surgeon should never despair of effecting a cure, but continue the dressings

so long as any reasonable hope of success remains. Sometimes, however, it may be proper to deviate from this rule and permit the patient to use the limb, even although the fragments should continue moveable—a practice first suggested, I believe, by Mr. Hunter. By adopting this plan, the formation of callus will be promoted and artificial joint often prevented. Indeed, in the early stage of this disease similar means have occasionally been used with success; at least friction, or rubbing of the fragments upon each other, has been found in a few instances to excite ossific action to a sufficient degree to effect a cure. In cases of long standing, however, there are two modes of procedure—the removal of the ends of the bone, or the introduction of a seton between them. The former has sometimes succeeded, but is difficult of execution, and liable to be followed by severe symptoms and even death; the latter is extremely simple, and when well managed rarely fails.

To Dr. Physick is exclusively due the merit of having first proposed and executed with success this ingenious operation. Upon my arrival in Edinburgh in 1806, I communicated to the elder Monro, and afterwards to several distinguished surgeons of London, the result of two or three cases in which Dr. Physick had introduced the seton with complete success. The only one, however, who seemed to feel an interest in the operation was Mr. Charles Bell, to whom, by particular request, I transmitted upon my return home in 1810, an account of all the cases in which Dr. Physick had then operated. These were afterwards published in the second edition of his “Operative Surgery,” and in answer to my communication, Mr. Bell remarks, “I have been reading your cases of the operation

of the seton in artificial joint to my class. I continue to think it one of the most ingenious things in modern surgery. I have a patient who I am in hopes will submit to the operation. He is a captain of an Indiaman. His thigh bone was broken by a spent cannon ball about eighteen months ago, and has not united." Upon showing Mr. Bell's letter to Dr. Physick, he desired me to say to him, that he had twice tried the seton in the thigh but without effect, and he was fearful it would not succeed in any case of the kind. Whether Mr. Bell afterwards performed the operation referred to, I have not ascertained; but that Dr. Physick's apprehension was unfounded, has since been proved by Mr. Brodie and others who have succeeded upon the thigh as well as other bones. That the seton sometimes fails there can be no doubt, but that it generally succeeds is equally certain:

A case occurred two or three years ago at the Alms-House, in which a seton was twice passed at different times, between the ends of a disunited humerus without effect. Dr. Hewson afterwards cut off the extremities of the bone with a saw, union took place and the patient recovered the use of his arm. On the other hand, a case is related by Mr. Samuel Cooper* "of a strong, robust man, whose chief peculiarity seemed to be his indifference to pain: the ends of his broken humerus were cut down to, turned out and sawn off by Mr. Long, in St. Bartholomew's Hospital, and the limb was afterwards put in splints, and taken the greatest care of; but no union followed."

* See Dictionary of Surgery

In general when the seton fails to procure reunion, there is reason to believe that it has not been continued a sufficient length of time. In 1806, I was present at an operation performed by Dr. Physick, upon the humerus of a woman residing at Baltimore; for some trivial reason, the physician under whose care the patient was left, removed the seton in two or three weeks, and no benefit of course resulted. Again—within the last two years, Dr. Physick passed a seton between the ends of a disunited lower jaw, and the patient returned home. In a little time his attending physician became anxious to remove the cord, under an idea that no union would take place; the patient, however, had promised Dr. Physick before his departure, that no one except himself should take it out. It was therefore continued a few weeks longer, and in the mean time perfect bony reunion was established.

To perform this operation, the surgeon should be provided with a skein of silk, and a long narrow seton needle, somewhat curved near the point. The limb should then be extended by assistants, in order to separate the extremities of the bones as much as possible from each other, while the surgeon passes the needle, armed with the silk, through the integuments and muscles, and between the bones, taking care to avoid all the large vessels and nerves. Over each orifice made by the seton is placed a bit of lint and a pledget, and the limb supported by a roller and splints. Four or five months should elapse before the seton is removed; at the end of this time the fragments will generally be found perfectly consolidated.

On Fractures, consult *Desault on Fractures, Luxations, and other Affections of the Bones*, translated by Caldwell, edit. 2d. 1811—*Boyer's Lectures on Diseases of the Bones—Boyer's Treatise on Surgical Diseases*, vol. 2d. by Stevens—*Dorsey's Elements of Surgery*, vol. 1. p. 118. edit. by Randolph—*Surgical Essays*, by Cooper and Travers—*Bell's Operative Surgery*, vol. 2d—*J. Bell's Principles of Surgery*, vol. 1. p. 587—*Pott on Fractures and Dislocations*, vol. 1—*A Treatise on Dislocations and on Fractures of the Joints*, by Sir Astley Cooper, 4to. London, 1822—*Dupuytren sur la Fracture de l'Extrémité Inferieure du Péroné, &c.* in *Annuaire Medico-Chirurgical*, tom. 1—*Roux's Narrative of a Journey to London in 1814*, 2d. edit. p. 159—*Cross' Sketches of the Medical Schools of Paris—Practical Observations in Surgery*, by Henry Earle, p. 17. octavo. London, 1823—*Larrey's Surgical Essays*, translated by Revere, p. 247—*C. Bell's Observations on Injuries of the Spine and of the Thigh Bone*, 4to.

On Artificial Joint, consult *Physick's "Case of Fracture of the Os Humeri, in which the Broken ends of the Bone not uniting in the usual Manner, a Cure was effected by Means of a Seton,"* in *New York Medical Repository*, vol. 1. p. 122—Also *Caldwell's Appendix to Desault—Dorsey's Surgery*, vol. 1. p. 133—*Brodie*, in *Medico-Chirurgical Transactions*, vol. 5th. p. 387—*Wardrop*, in the same work, vol. 5. p. 365—*Roux's Journey*, p. 172—*Hutchinson's Practical Observations in Surgery*, p. 162—*Inglis on Unnatural Articulations*, in *Edinburgh Medical and Surgical Journal*, vol. 1. p. 419—*White's Cases in Surgery*.

CHAPTER VIII.

LUXATIONS.

THE term luxation, or dislocation, implies the removal of the head of a bone from its corresponding articulating cavity. To designate the varieties of the accident, other appellations have been usually employed—simple and compound, primitive and consecutive, recent and old, complete and incomplete luxation. By *simple* luxation is understood a mere removal of the head of a bone, accompanied by laceration of one or more ligaments—by *compound*, that variety of luxation in which an external wound communicates with the cavity of the joint. In *primitive* luxation, the head of the bone continues in the unnatural position it first assumed—in *consecutive*, it abandons the first situation and becomes fixed in another. The terms *recent* and *old* refer merely to the duration of the injury, whilst *complete* and *incomplete* denote total and partial displacement.

All the articulations, with few exceptions, are liable to luxation; but the *orbicular*, on many accounts, are most exposed to such injuries. The *ginglymoidal* joints, on the other hand, are so constructed as to render their displacement, in most instances, extremely difficult. External violence is the most common cause of luxation, though it is frequently produced by muscular action alone; in other instances the displacement is brought about by a preternatural laxity of the ligaments, or a paralytic state of the muscles

surrounding the joint. Sometimes the head of a bone is slowly removed from its socket by disease, or by the growth of a tumour within the capsule.

Parts recently luxated, when examined by dissection, commonly exhibit the following appearances. Besides laceration of the capsule and ligaments, most recent luxations are accompanied by an effusion of a greater or less quantity of blood in the neighbourhood of the joint, by rupture or extension of tendons and muscular fibres, and by injury of nerves. However the inflammation that follows, seldom terminates in suppuration, but slowly subsides, the effused blood is absorbed, and the functions of the injured parts are afterwards in a measure restored. In the mean time the head of the displaced bone accommodates itself to its new situation, and forms a cup in the cellular membrane, muscle, or bone, against which it rests, whilst adventitious ligaments are created from the surrounding cellular tissue, and either unite with the remains of the torn capsule or become fixed to the bone and secure it firmly in its place. After a time some motion is acquired, and the use of the limb may be partially restored.

Luxations are often confounded with other injuries, especially fractures; but from these they may be readily distinguished by want of crepitation; by the peculiar distortion and rigidity of the limb, which, according to the kind of displacement, is either lengthened or shortened, while the head of the bone is so fixed as to be nearly immoveable. Together with these signs an unnatural prominence or depression may be generally felt in the vicinity of the injured joint, but differing materially from that inequality often observed in fracture.

Treatment of Luxations.

Constitutional as well as local means are generally necessary in the reduction of dislocated bones. The former, indeed, often exert greater influence over the action of muscles, (the chief impediment to reduction,) than any mechanical force, however powerful, that can be employed. The most efficient remedies of this description are blood-letting ad deliquium animi, the warm bath, nauseating emetics, intoxication, &c. Of these blood-letting is decidedly the most powerful. The practice is said to have been first suggested by Monro the second, but was never until the time of Dr. Physick carried to an extent necessary for complete success.* Having derived full advantage from constitutional remedies, which should always precede any mechanical efforts to effect reduction, *extension* and *counter-extension* may be resorted to. For this purpose, the hands of assistants, aided, if necessary, by napkins or sheefs, should be employed; or pulleys, as they keep up a more steady and effectual extension may be preferred. It is still a matter of dispute whether the extending force ought to be exerted upon the luxated bone or upon a remote one. Both expedients, it appears to me, are occasionally necessary; but as a general practice I prefer the latter mode, inasmuch as the muscles about the injured joint are less liable to be stimulated to contraction, whilst by increasing the distance between the luxated part and the extending force a more powerful lever is procured. As a general rule the *counter-extending* means should at least equal

* Dorsey's Surgery, vol. i. p. 225. edit. 3d.

the extending, and both must be applied in such a way as to produce the least possible irritation. To obviate any inconvenience of this kind, the surgeon will often find it necessary to cover the skin with soft buckskin or some similar material. Sir Astley Cooper,* to prevent the extending bands from slipping, has suggested the ingenious expedient of confining them to the skin by a *wet* roller or bandage—the most important and original idea, perhaps, contained in his practical work.

The only general direction necessary to observe in relation to extension and counter-extension is, that the force be exerted *gradually*, and kept up for a considerable time, in order to fatigue the muscles and overcome their resistance. If this be well managed, a slight effort in the way of coaptation will generally prove sufficient to restore the bone, under circumstances where sudden and violent force would have failed. *Old* luxations should be treated upon the principles just laid down, but it may be found necessary to persevere in the efforts of reduction for a much longer period than in recent cases, and in addition to the extending forces, to break up by rotatory motions of the limb the adventitious ligaments about the head of the bone and new-formed socket. Having restored the bone to its former place, it only remains to prevent its subsequent escape, and to procure if possible reunion of the edges of the torn capsule. This may frequently be accomplished by an appropriate bandage and by rest. *Compound* luxation should be treated upon the same principles as compound fractures.

* Treatise on Dislocations and Fractures of the Joints.

SECTION I.

Luxation of the Lower Jaw.

OWING to the peculiar conformation of the articulation of the lower jaw, luxation can take place only in one direction—*anteriorly*. Both condyles are usually dislocated at the same moment; though it often happens that one is removed while the other remains in its socket. In either case the *signs* of the accident are very decisive. When *both* condyles are displaced, the mouth is widely opened and cannot be shut, the coronoid process projects under the cheek bone, a depression is felt anterior to the ear, the saliva dribbles from the mouth, and the patient speaks and swallows with great difficulty. Dislocation of a *single* condyle may be known by the lateral distortion of the jaw, by the projection of one coronoid process, and by a hollow before the ear of the same side. Excessive yawning or a blow upon the chin, while the mouth is widely extended, are the most frequent causes of luxation of the lower jaw. Sometimes the accident is produced by a spasmodic action of the muscles, induced by an attempt to extract a tooth. In delicate females the lower jaw is occasionally subject to partial displacement or to *subluxation* from preternatural laxity of the ligaments.

Treatment of Luxation of the Lower Jaw.

Provided the luxation has not been of long standing, little difficulty is commonly experienced in reducing it.

The patient should be placed on a low seat, with an assistant behind to support his head; the surgeon stands before him, and placing his thumbs deep in the mouth rests them upon the posterior molares teeth; whilst his fingers are carried beneath the chin and base of the jaw. Pressure is then made downwards by the thumbs, to disengage the condyles from the roots of the zygomatic process; at the same time the chin is elevated by the fingers, and the condyles are suddenly dragged into their places by the spasmodic action of the muscles. To prevent the thumbs from being injured by the sudden approximation of the teeth, they should be slipped to one side as soon as the surgeon perceives the jaw to yield, or they may be protected, before the operation is commenced, by thick gloves. If the jaw cannot be reduced in this way, an attempt should next be made to replace first one condyle and then the other, and this plan seldom fails. To obviate a recurrence of the accident, the bandage for fractured lower jaw must be worn for eight or ten days.

For *subluxation* of the jaw, arising from extreme relaxation of the ligaments, Sir Astley Cooper recommends the shower bath, a blister before the ear, and the internal use of ammonia and steel.

SECTION II.

Luxation of the Clavicle, Ribs and Vertebrae.

THE clavicle may be luxated either at its sternal or humeral extremity. Of the two accidents, however, the latter is more frequent, though neither is very common. The sternal portion is susceptible of luxation in three directions only—forwards, backwards and upwards. Luxation downwards is effectually guarded against by the resistance afforded by the cartilage of the first rib. The *anterior* luxation is characterized by a hard rounded tumour, immediately over the top of the sternum, which recedes in proportion as the shoulder is carried outwards. Luxation *backwards* may be known by the preternatural hollow at the superior edge of the sternum, and by a projection over the lower part of the neck, while luxation *upwards* can be readily distinguished from any other injury, by the particular situation of the rounded end of the clavicle, and the close approximation of the injured bone to that of the opposite side.

Of these different luxations that *forwards* is almost the only one met with. It is generally produced by a forcible retraction of the shoulders. Luxation *backwards*,* on the other hand, if it proceed from violence, must arise neces-

* For an account of a very extraordinary case of backward luxation, see Sir Astley Cooper's Treatise on Dislocations, &c. p. 402.

sarily from the shoulder being carried forcibly forwards. To produce luxation in an upward direction, the shoulder should be forcibly depressed.

The *humeral* portion of the clavicle, when luxated, generally passes over the acromion process, and forms so considerable a projection on the top of the shoulder as to render the nature of the injury very evident. Sometimes, however, the extremity of the bone is forced downwards and glides beneath the acromion. The accident is commonly produced by a violent blow or fall upon the shoulder or scapula.

The *treatment* of luxation of either extremity of the clavicle does not differ in any respect from that of fracture of the same bone. It is hardly possible, however, to effect a cure without deformity.

It not unfrequently happens, that the sternal extremities of the *ribs* are separated from their cartilaginous appendages, and become protuberant. The sixth, seventh, eighth and ninth ribs are most subject to this species of displacement. Luxation of the vertebral ends of the ribs, if not impossible, must be extremely rare. The most remarkable case perhaps on record, of luxation of the anterior extremities of all the ribs, is detailed by Mr. Charles Bell in his "Surgical Observations." Luxations and fractures of the ribs must be treated upon the same principles.

The *vertebræ* are so seldom luxated, and the symptoms which follow any accident of the kind so violent and unmanageable, that it seems almost superfluous to notice such

injuries. Indeed it has been doubted by high authority,* whether luxation of the vertebræ ever occurs independently of fracture. There can be little question, however, that the *cervical* vertebræ, at least, are liable to dislocation. In such cases we commonly find that the *dentatus* is separated from the *atlas*, and its tooth-like process forced upon the spinal marrow so as to occasion instantaneous death. From the close and firm connexion between the atlas and skull, it is hardly possible that the one should be separated from the other. Should luxation of any of the cervical vertebræ below the origin of the phrenic nerve take place, the patient may survive some time, or perhaps recover. Partial or incomplete luxations of the cervical vertebræ are now and then met with. In such cases the head is usually twisted to one side, and any attempt to remove the deformity or replace the bones would probably terminate in death.

* Sir Astley Cooper

SECTION III.

Luxation of the Arm.

OWING to the peculiar structure of the shoulder, and the extreme mobility of the arm, luxation is more frequent in this than in any other articulation. It may take place in three directions—*downwards, forwards, and backwards*. *Consecutive luxation upwards* is occasionally met with. In this case the head of the os humeri abandons the unnatural situation it first occupied, and passes behind the clavicle. *Primitive luxation upwards*, however, can never happen, being effectually guarded against by the acromion and coracoid processes and their intervening ligament.

Luxation downwards, or into the *axilla*, is the most common, and usually results from force applied to the elbow while the arm is removed from the body and elevated. A depression below the acromion, a tumour, formed by the head of the bone, in the axilla, when the arm is carried from the body, an inability to perform the motions of circumduction, and a peculiar obliquity of the arm outwards, will in general be sufficient to enable the surgeon to distinguish the accident from fracture of the neck of the os humeri, or from any other injury. In *recent* luxations of the humerus downwards, the capsular ligament will generally be found extensively torn on the inner side of the glenoid cavity, and the head of the bone resting upon the inside of the scapula between the triceps and subscapularis

muscles. In many cases, also, the *tendons* of the supra and infra spinatus and subscapularis are lacerated, but that of the long head of the biceps is seldom injured. When the head of the bone has remained long unreduced, it forms for itself a new bed or socket, in which it rolls, and after a time may acquire a considerable extent of motion; the adhesions, too, and adventitious ligaments which are created from the surrounding parts may involve the adjoining arteries and nerves, and closely connect them with the displaced bone.

Luxation of the humerus *forwards*, is commonly produced by violence applied to the elbow while the arm happens to be elevated and carried backwards beyond the body. It may also arise from a blow upon the head of the bone. In either case the capsule of the joint is ruptured at its anterior part, and the head of the humerus is pushed forwards and lodged beneath the pectoral muscles, below the clavicle, and on the inner edge of the neck of the scapula. The diagnostic marks of the accident are still more evident than those of luxation downwards. Besides the depression beneath the acromion, which accompanies every variety of luxation of the shoulder, the head of the humerus may be distinctly felt, and often forms a very conspicuous protuberance immediately below the clavicle. In addition to these symptoms the arm is shortened, the elbow carried out from the body and directed backwards, and upon rotating the arm the head of the bone rolls beneath the finger in such a way as to render it almost impossible to mistake the nature of the case.

Although many have denied the possibility of dislocation

of the humerus *backwards*, there are cases enough on record not only to establish its existence, but to point out clearly its symptoms and treatment. Still, however, the accident must be considered extremely rare, for during the space of thirty-eight years only two cases of the kind have occurred at Guy's Hospital.* Three instances of the same variety of dislocation have been reported to Sir A. Cooper, and others are mentioned by Boyer.† In eighteen hundred and eleven Dr. Physick was called to a case of this description, produced by a fall through a hatchway; and I attended the same patient, (Mr. J. S. grocer, in Market street,) in eighteen hundred and twenty-two, for dislocation of the same shoulder into the axilla. The *signs* of luxation of the humerus backwards are, in addition to those common to the other varieties, a protuberance of considerable magnitude, on the dorsum below the spine of the scapula, formed by the head of the bone, and an approximation of the arm to the chest, across which the forearm is obliquely thrown. A violent blow or fall upon the shoulder is the most frequent cause of this dislocation.

Partial or incomplete luxation of the os humeri is sometimes met with. In such cases the head of the bone is generally forced towards the anterior part of the glenoid cavity, and rests against the coracoid process. *Compound* luxation of the shoulder is extremely rare.

* See Sir A. Cooper on Dislocations and Fractures, p. 441

† Treatise on Surgical Diseases, vol. ii. p. 256.

Treatment of Luxation of the Arm.

Recent luxations of the shoulder are often reduced by very slight extension and counter-extension. Much, however, will depend upon the kind of displacement, and the direction in which the efforts are made. A good general rule to observe in all luxations *downwards*, is to extend the arm as nearly as possible in the line of the body, instead of carrying it off, as is usually done, at right angles. In nine cases out of ten the most effectual plan is to stretch the patient upon a mattress, table, or floor; the surgeon then lies beside, but opposite to him, and placing a heel in the axilla makes counter-extension, and extension by pulling at the wrist. Should this process be found insufficient, owing to the resistance of the muscles, the forces may be increased by folding a sheet diagonally, placing the centre of it in the axilla, carrying the ends over the opposite shoulder, and securing them to a staple or post—taking care previously to fill the axilla with a ball of linen or some similar substance, to take off pressure from the edges of the pectoralis major and latissimus dorsi muscles. Another sheet or towel, folded in a similar way, must next be secured to the wrist or above the elbow by a wet roller, and its ends given to two or three stout assistants. It only remains to fix the *scapula*, without which extension and counter-extension would prove of little service. This is done by a third sheet, the middle of which is placed upon the acromion process, and there held by another assistant, while the ends are carried across the chest and firmly secured at the opposite side. Should these means also fail, recourse may be had to the pulleys, still keeping the patient in the horizontal position,

and merely substituting the pulley for the *extending* band. If in spite of these efforts, the head of the bone still remains unreduced, it may be well to remove the apparatus, and, fixing the patient on a low seat in an upright position, proceed in the following way. Pass the middle of a broad sheet around the chest, and fasten its ends securely at some distance from the patient and opposite the injured shoulder. Then roll the arm just above the elbow in soft buckskin; over this place the middle of a napkin, and bind it by a roller to the arm. Next tie the ends of the napkin together, and hook them upon a pulley fastened at the floor. Lastly, secure the scapula by passing the centre of a towel or leathern strap, hollowed out for the purpose, over the acromion process, and give the ends in charge to one or more assistants, seated upon the floor next to the sound side of the patient. Every thing being ready, the surgeon takes hold of the patient's forearm, and bending it across the chest, uses it as a lever, and communicates a rotatory motion to the arm, while an assistant is directed to keep up a very slow and gradual extension by tightening the cord of the pulley.

This plan seldom fails, provided the force employed is continued a sufficient time and without violence, especially when conjoined with blood-letting, nauseating antimonials, &c. *Old* luxations of the os humeri should be treated in a similar way, though equal success is not to be expected. It is important to know, however, that the head of the bone has been restored to the glenoid cavity after the lapse of *four* or *six* months. In all such cases, Desault's plan of lacerating the capsule and new-formed ligaments by forcible rotation of the arm must be pursued. No danger ever

results from this, provided the head of the bone has formed no accidental connexion with the axillary artery. Under these circumstances, the rupture of the vessel is the inevitable consequence of restoration of the bone, whether effected by violence or by gradual extension; as happened at the Alms-House Infirmary two or three years ago, in a case the particulars of which I have detailed at full length in another publication.*

To reduce a luxation of the shoulder *forwards*, the elbow should be directed backwards and the arm drawn downwards as close to the side as possible. Counter-extension may be made in the usual way or by the heel in the axilla. In luxation *backwards* the arm must be elevated above the head; this will have a tendency to carry the head of the humerus downwards and disengage it from the *dorsum scapulæ*, from which it will slip into the axilla, and may afterwards be reduced according to the directions already given for the management of dislocation downwards.

* See the Philadelphia Journal of the Medical and Physical Sciences, vol. vii. p. 81.

SECTION IV.

Luxation of the Forearm.

FROM an examination of the structure of the elbow joint it might be supposed that luxation could scarcely happen in any direction. There is one direction, however, in which luxation is exceedingly frequent—*upwards* and *backwards* of both bones of the forearm. *Laterally*, luxation is very uncommon, and anteriorly can hardly occur without a previous fracture of the olecranon process.

The luxation *upwards* and *backwards* is generally produced by a fall, in which the patient extends his arm to save the body, and receives the whole shock upon the palm of the hand. A tumour, formed at the bend of the arm, by the condyles of the humerus, and covered by the brachialis internus and biceps muscles in a state of violent distention, by the contraction of which the forearm is kept in a state of semiflexion, and a large protuberance on the back of the elbow produced by the unnatural projection of the olecranon, will be sufficient to point out the precise nature of the injury.

Lateral luxations of the elbow may be known by the internal or external displacement of the bones composing the joint, or in other words, by the peculiar deformity attending each variety of the accident. The luxation *ante-*

riorly, should it ever occur,* independently of fracture of the olecranon, may easily be recognised by the posterior projection of the condyles of the humerus, the extended position of the forearm, and the prominence of the coronoid process at the bend of the arm.

Besides luxation of *both* bones of the forearm from the humerus, the *upper* and *lower* extremities of the radius and ulna may be separated from each other. The direction of displacement of the *upper* extremity of the *radius* may be either *backwards* or *forwards*. The former is the most frequent and is commonly produced by inordinate action of the pronator muscles, the effect of which is to dislodge the bone from the lesser sigmoid cavity of the ulna and place it on the outside of the olecranon, where it may be distinctly felt, forming a considerable eminence; at the same time the hand is fixed in a state of pronation. In luxation of the radius *forwards*, which is extremely rare, the hand will be found in a state of supination, and the head of the radius may be felt projecting at the bend of the arm.

The *lower* extremity of the *ulna* sometimes abandons the sigmoid cavity of the radius and projects *posteriorly*. At other times, though rarely, it is pushed *forwards*. In the former case the hand is in a state of pronation, and the end of the ulna is felt behind the radius; in the latter the ulna projects on the front of the wrist, and the hand is fixed in a painful state of supination.

* One case of the kind is recorded by Delpech.

Treatment of Luxation of the Forearm.

There are several modes of reducing the dislocation upwards and backwards of both bones of the forearm at the elbow joint, but I prefer the following. The patient should be seated on a chair, while the surgeon, placing his knee in the bend of the arm, makes counter-extension and extension by grasping the forearm just above the wrist; at the same time the forearm is bent nearly at a right angle upon the arm. This plan seldom fails, and the bones return to their places with an audible snap. The forearm should afterwards be carried across the chest and sustained by a sling, or, by way of additional security, may be surrounded by splints and kept still for a week or ten days. *Old* luxations of the elbow, or those which have existed beyond three or four months, can seldom be reduced. To reduce a *lateral* luxation of the elbow, Sir A. Cooper recommends forcible extension of the arm in order to oblige the tendons of the brachialis internus and biceps muscles, which are stretched over the condyles of the humerus, to act upon the principle of the string of a pulley, and drag the bones into their places.

To reduce a *backward* luxation of the upper end of the *radius*, nothing more is necessary than for the surgeon to force the patient's forearm with one hand towards supination, and with the other to push the head of the radius from behind forwards. By these simultaneous efforts, the bone suddenly starts into its place, and the deformity and other symptoms instantly disappear. Luxation of the same bone

forwards, must be treated upon the same principles, but the force should be exerted in an opposite direction.

Luxation of the *lower* extremity of the *ulna* is commonly reduced without difficulty. When displaced in a *backward* direction, the hand should be gradually but forcibly extended, and moved laterally until restored to its supine position. A slight pressure on the head of the bone will then be sufficient to replace it. In luxation *forwards* the hand must be carried downwards, or in the direction of the state of pronation.

SECTION V.

Luxation of the Hand.

UNDER this division may be included dislocations of the wrist, of the carpal and metacarpal bones, and those of the fingers and thumb. None of these injuries are very common, and when they do occur, are generally accompanied with wounds and fractures, produced by heavy weights, or by the bursting of a gun. The radius may be merely dislocated, however, from the carpal bones, either in an anterior, posterior, or lateral direction. In all these cases, the most common cause of the accident is a fall upon the palm, back, or edges of the hand.

An anterior luxation may be known by the projection of the carpus in front of the wrist, by the tension of the flexor muscles, and the extended position of the hand. A posterior luxation, on the contrary, will be characterized by the flexed position of the hand, by a protuberance on the back of the wrist, and by the tension of the extensor muscles. Lateral luxations are easily distinguished by the projection or deformity at the radial or cubital edges of the wrist.

The *carpal* bones are so firmly connected to each other by short ligaments and by a ball and socket joint, as to be scarcely susceptible of luxation. Instances, however, are now and then met with, of displacement of the *os magnum* and *os cuneiforme*, either from violence or from extreme

relaxation of their ligaments. The *metacarpal* bones are, perhaps, never luxated, except by a gunshot wound or some similar violence.

The *fingers*, from their mobility and the strength of the ligaments and tendons surrounding them, are very seldom luxated. Indeed, except in a backward direction, owing to the peculiar conformation of the articulating surfaces, a dislocation would seem almost impossible. The *thumb*, however, is not unfrequently luxated, either at the articulation of the metacarpal bone with the trapezium, or at the junction of the first or second phalanx. Dislocation of the first phalanx from the metacarpal bone is the most common, and may be known by the projection of the latter inwards, or towards the palm of the hand, while the former is mounted upon the metacarpal bone, and forms a considerable eminence backwards.

Treatment of Luxation of the Hand.

Luxations of the lower extremity of the radius, whether in an anterior, posterior, or lateral direction, must be treated upon the same principles—by extension, counter-extension, and pressure on the protruded bone, and by bandages and splints after the reduction is accomplished.

To restore a displaced *os magnum* or *cuneiforme*, will often be found very difficult; and to retain them fixed in their natural situation still more so, especially when the luxation proceeds from relaxation of the ligaments. Well

directed pressure, and an appropriate bandage, are the only remedies.

Strange as it may seem, the dislocated *thumb* sometimes remains irreducible in spite of the most powerful efforts the surgeon can make. Instances, indeed, are not wanting, of the thumb being dragged off during violent efforts to reduce it. These difficulties may probably be traced to the common practice of making the extension in a straight line, (by which the heads of the bones are wedged into each other,) instead of bending the dislocated bone downwards in a semicircular sweep. Should the mere manual efforts of the surgeon prove insufficient, a piece of tape, doubled into the form of the "single hitch," or sailor's knot, may be secured to the thumb, previously covered with a piece of buckskin, and a greater degree of force exerted, but still in the direction recommended—downwards or towards the palm of the hand. If this treatment also fail, the surgeon must not, like Sir A. Cooper, despair of success, and under the idea that "the patient will have a very useful thumb after a time, even without reduction,"* abandon all other resources, but promptly execute the ingenious and efficient plan of Mr. Charles Bell†—the division of one of the lateral ligaments by the oblique insertion of a couching needle.

Luxation of the *fingers* should be managed in every respect like that of the thumb. One or more *toes* are sometimes dislocated by the relaxation of their tendons, and

* See Cooper on Dislocations, &c. 4to. p. 533.

† See Operative Surgery, vol. ii. p. 261.

become very much deformed, and so inconvenient to the patient by impeding his walking, as frequently to require amputation. In three or four instances of the kind, I have performed the operation on this account, and with complete success. To relieve this deformity, Boyer,* instead of amputation, has proposed the removal of a portion of the extensor tendon belonging to the deformed toe, and relates two cases in which the operation proved effectual.

* Treatise on Surgical Diseases, vol. ii. p. 384.

SECTION VI.

Luxation of the Thigh and Pelvis.

THE thigh bone is more subject to fracture than dislocation, though the latter is by no means uncommon. It may take place in four directions—upwards and outwards on the dorsum of the ilium, downwards and inwards into the foramen ovale, upwards and forwards on the pubes, and backwards into the ischiatic notch. The first two are the most frequent, and the latter extremely rare.

Luxation *upwards* and *outwards* is generally produced by a fall upon the foot or knee, while the thigh is directed forwards and obliquely inwards. The round ligament and the upper portion of the capsular being torn, the head of the bone escapes, and lodges first upon the convex surface of the ilium, but soon changes its position, and sinks into the external iliac fossa, where it afterwards remains. A prominence near the superior spinous process of the ilium, formed by the great trochanter, together with a shortening of the limb and an inclination of the foot inwards, are sufficiently characteristic of the nature of the accident.

Luxation of the femur *downwards* and *inwards*, differs materially from the foregoing. The limb is *lengthened* by two or three inches, the foot turned *outwards*, the great trochanter removed from the superior spinous process of the ilium; and the head of the bone, especially in thin

subjects, distinctly felt at the foramen ovale, or upper part of the thigh. This accident is produced by a forcible abduction of the thigh, or by violence applied while the thighs are extensively separated from each other. The round, as well as the capsular ligament, is generally torn, and the head of the bone rests upon the obturator externus muscle.

Although luxation on the *pubes* is seldom met with, the exact situation of the head of the bone, and the manner in which the accident is produced, are well known. A hard tumour may be felt above Poupart's ligament, on the outside of the femoral vessels; the limb is shortened about an inch; the foot is turned outwards, and the trochanter major placed in front of the anterior superior spinous process of the ilium. This species of luxation must invariably happen from force applied while the limb is carried backwards and fixed, and from the body being at the same time thrown off its balance and directed backwards. Dr. Physick* once met with a case of luxation of the femur on the pubes, in which the affected limb, instead of being shorter, was somewhat longer than the sound one.

When the head of the os femoris is forced *backwards* and lodged in the ischiatic notch, the limb will be found shorter by half an inch or an inch than that of the opposite side, and the foot slightly inclined inwards. Owing to the depth of the notch, the head of the bone can seldom be felt. To produce this variety of luxation, the force should be applied while the thigh is bent upon the abdomen, or the body is thrown forward upon the thigh.

* Dorsey's Surgery, vol. i. p. 271

Treatment of Luxation of the Thigh and Pelvis.

The muscles surrounding the hip and thigh bone are so large and powerful, that the surgeon must expect to encounter very considerable resistance in his efforts towards reduction. Whatever may happen to be the direction of displacement, with little variation, the same means must be employed. In addition to the general treatment formerly recommended for all luxations, and which will be found particularly necessary in luxations of the thigh, very powerful but gradual and long continued extension and counter-extension must be resorted to as soon after the accident as possible.

The patient being stretched upon a table, covered with a mattress or blankets, the middle of a large sheet folded diagonally is placed in the perineum of the *sound* side, and its twisted ends carried before and behind the pelvis along the body and beyond the shoulders of the patient, are secured to a post, a staple in the wall, or to any unyielding fixture. Another sheet, folded in a similar way, is fixed upon the spine of the ilium, and its ends being carried across the pelvis are given in charge to one or more assistants. Lastly, a piece of buckskin is applied to the injured limb, just below the knee; over this is placed the centre of two towels, one on the outside, the other on the inside, parallel with the limb, to which they are secured by several turns of a wet roller. The four ends of the towels are then tied together, and in the loop thus formed the hook of a pulley is fixed, and its opposite end fastened to a staple in the wall.

Every thing being arranged, the assistant having charge of the pulley, is directed to set it in motion and to keep up a very *gradual* extension, while the assistants holding the transverse sheet which is intended to fix the pelvis and prevent it from descending, keep it tense; the surgeon at the same time taking hold of the leg with both hands, bends it upon the thigh nearly at a right angle, and rotates it in different directions.

By continuing these efforts gradually and for a considerable length of time, in some instances two or three hours, we can scarcely fail to restore the head of the bone, provided it has not been displaced for many weeks or months, in which case success will hardly be possible under any treatment.

It must be particularly remembered—that the *direction* of the extension and counter-extension should *vary* according to the direction of the displacement, or the variety of luxation that may happen to exist. In some cases it may be found necessary to place the counter-extending band in the perineum of the *injured* side, but in general, the mode recommended should be preferred, inasmuch as the muscles about the dislocated bone are thus left free, and will not be stimulated to resistance.

Luxation of the bones composing the *pelvis*, is rather a possible than probable occurrence, and on this account is seldom particularly noticed by systematic writers. The remark is peculiarly applicable to dislocation of the *sacro-iliac symphysis*. An accident of this description, however, having occurred in my practice during the winter of 1827,

I take the liberty of inserting the particulars of the case in this place, as drawn up by my very intelligent friend, Dr. Harris, of the United States' Navy.

"Mrs. ———, the subject of this case, is thirty-five years of age, of a slender and delicate form, and the mother of a child, which at the time of the accident was two years old. On the 27th of January, 1827, she received a violent blow on her sacrum, inflicted by her husband with his clinched fist. She immediately fell, and was unable to rise. Severe pain was felt about the right sacro-iliac junction, accompanied with nausea and faintness.

"Dr. Gibson, professor of surgery in the University of Pennsylvania, was consulted a few hours after the occurrence of the accident. Upon examination he found a considerable hollow over the upper part of the sacrum, produced by the unnatural backward projection of the posterior superior spinous process of the ilium. When the patient moved her right leg, an aggravation of the pain was experienced, accompanied by a distinct crepitation. The slightest motion conveyed an impression to her, as if, to use her own language, her "hip bones were separating." These symptoms satisfied Dr. Gibson that a dislocation, or *diastasis* of the sacro-iliac symphysis had taken place. The patient was bled, and directed to take an anodyne draught, and a soap plaster was applied over the injury.

"*Jan. 28th.* Passed a restless night—pain continues acute, and a burning sensation is felt in the site of the dislocation. Her bladder and intestines continue to perform their na-

tural functions; thus affording satisfactory evidence, that no material mischief has been done to the spinal marrow.

“In consequence of professor Gibson’s numerous engagements, he was unable to continue his visits to the patient, particularly as she lived at an inconvenient distance. He therefore very kindly placed the case under my charge.

“*Feb. 1st.* In addition to the symptoms already detailed, I find upon lifting up the soap plaster, a considerable ecchymosis over the injured articulation.

“*Feb. 3d.* Complains of creeping rigors, which extend from the lower part of the sacrum to the middle of the dorsal vertebræ. The slightest motion produces a recurrence of the chills, and an aggravation of the pain. While, however, the patient continues to lie on her left side in a state of perfect quietude, her sufferings are much less severe than they were during the first four days: any other position occasions great pain. No material alteration in the symptoms was observed until

“*Feb. 10th.* Experiences acute lancinating pain about the right sacro-iliac junction, accompanied with some fever and restlessness. The partial rigors are less frequent. A dose of oleum ricini was prescribed, which operated freely, and procured relief from the pain and fever.

“*Feb. 12th.* No fever, and while perfectly quiet, exempt from pain. Applied a roller around the pelvis, which affords her, as she states, comfortable sensations.

“*Feb. 14th.* Patient complains that the bandage around the pelvis excites uneasiness. It was in consequence removed, and a fresh soap plaster applied.

“*Feb. 16th.* Severe pain is felt in the right knee, similar to that which arises sympathetically from diseased hip-joint. The chilly sensation in the course of the spine, has not been felt since yesterday morning.

“*Feb. 20th.* Pain continues in the knee, but in other respects more comfortable. Accidentally moved her right leg this morning, but without producing crepitation, or much pain.

“*Feb. 25th.* No pain is felt in the knee, and the patient says she feels in every respect much relieved. Applied a padded and quilted girdle around the pelvis, which was secured by a lacing cord. She is now allowed to indulge in her ordinary diet.

“*March 8th.* An attempt was made to-day to raise the patient in bed; but as it produced an aching sensation in the injured part, she was immediately replaced in her former position.

“*March 14th.* Perfectly free from pain. Another attempt was made to raise the shoulders in bed, which produced less inconvenience. Remained in this situation twenty minutes, when she complained of fatigue.

“*March 16th.* Was again raised in bed, and continued in this situation for half an hour without suffering much un-

easiness. From this date, she was raised every day to a semi-recumbent position, and so continued during the space of an hour, until

“*March 30th.* Was lifted to-day from bed, but in consequence in part at least of the debility of her muscles, was unable to stand. Directed that she should be placed every day in a cushioned arm-chair.

“*April 10th.* With a little assistance, stood to-day for three or four minutes.

“*April 15th.* Aided by a cane, she walked from the chair to the bed.

“*April 20th.* Walked across the room without any assistance, but with some difficulty.

“*April 27th.* Walking considerably improved. The patient now feels but little inconvenience from the injury.

“*May 4th.* Walked down and up stairs. The posterior projection of the ilium, and the corresponding depression of the sacrum, are still very apparent. The latter bone appears to have been forced inwards about half an inch. The great breadth of this articulation, or synchondrosis, will allow of a displacement to this extent; and still there will remain opposed to each other, surfaces of sufficient width to sustain, when properly united, the weight of the body.

“Considering the firmness of the union between the sacrum

and ilium, supported as it is by powerful ligaments, it would seem almost impossible, that a blow with the fist could separate them. It may be well to state, however, that the individual who inflicted the injury, possessed great muscular strength, that the patient was delicately formed, and that, in this particular case, there may have been an unnatural weakness of the articulation. Whether this local weakness had always existed, or whether it had been superinduced during some particular derangement of the system, is altogether a matter of conjecture.

“That relaxation, and even partial separation of the pelvic articulations do sometimes take place during pregnancy, is fully established by the testimony of Ambrose Pare, Petit, L’Heretier, Boyer, and others. Their opinions upon this point are not the result of speculations, but founded upon satisfactory post mortem examinations. In some instances, these bones were reunited, and in others, they continued separated, and the unfortunate patient was, in consequence, bed-ridden for life.

“If the reports of these distinguished surgeons be correct, it will not be unreasonable to suppose, that our patient may have experienced during her last and only pregnancy, this partial relaxation of the sacro-iliac symphysis, which may have been increased by the severe and protracted accouchement, which she reports herself to have then experienced. Though a considerable time have elapsed from the period of her delivery to the occurrence of the accident, still it may not have been sufficient to restore the synchondrosis to its original strength. It is only by admitting this sup-

position, that we can account for the production of an injury, by means apparently so inadequate.

“This is so rare an accident, that some surgeons have doubted the possibility of its occurrence under any circumstances, unless in connexion with fracture of the pelvis, or concussion of the spinal marrow. The degree of external violence required to produce such an effect, does at the same time so much injury to the spinal chord and pelvic viscera, as to render the dislocation the most simple part of the case. When the accident is thus complicated, it always sooner or later terminates fatally. Cases of this character are recorded by Boyer, Astley Cooper, and others.

“The only case of *simple* dislocation of the sacro-iliac synchondrosis which I have been able to find, besides the one now recorded, was reported by Eneaux, Hoin, and professor Chaussier, and published in the *Recueil des Memoires de l'Academie des Sciences de Dijon*. As I have not at present access to this work, I will subjoin the following extract from their report, which may be found in the 4th volume of Boyer's Surgery.

“ ‘The left os innominatum was dislocated and displaced upwards. The inflammatory condition of the part forbade all attempts at reduction. After using for several days relaxing applications, and an antiphlogistic regimen, an attempt was made to replace the bones, which was opposed by a recurrence of the pain, and followed by a return of the inflammatory symptoms. After some days, we renewed the attempt at reduction, but with the same result, when

it was determined to renounce all further efforts. After a prolonged rest, but shorter than could have been desired, the patient left his bed; and having commenced walking with the assistance of crutches, the weight of the limb corresponding with the injured side, drew the displaced ilium downwards, and thus gradually effected a reduction. The patient ultimately recovered, and was enabled to resume his employment as a bricklayer.*

“It is not stated, either in what manner the accident occurred, or what length of time was required to accomplish the restoration.”*:

* The North American Medical and Surgical Journal, No. VII. July, 1827, page 77

SECTION VII.

Luxation of the Knee and Ankle.

AN examination of the structure of the knee joint, would lead one to believe that a luxation of the tibia from the condyles of the femur was hardly possible; yet there are many instances of the kind on record. The luxation may be complete or incomplete, and take place in an anterior, posterior, or lateral direction. Complete luxation is extremely rare,* and generally followed by most violent symptoms and even death, unless obviated by timely amputation. Lateral luxations, or those outwards and inwards, are more common than either the anterior or posterior. They are all easily distinguished by the peculiar deformity or projection of the tibia in the direction the luxation happens to occur.

There is a species of luxation of the knee joint, first particularly noticed by Mr. Hey, arising, it is imagined, from relaxation of the ligaments of the semilunar cartilages, by which these bodies become loosened and change their situation. The disease is not very common, but is always found troublesome and difficult of cure. It impedes and sometimes altogether prevents the patient's walking, though there is seldom much pain experienced.

* See ante, p. 160.

The *patella*, by a sudden blow, is sometimes forced to the outer or inner sides of the knee, and the patient finds himself unable to walk or bend the leg. Luxation *outwards* is more frequent than that inwards, and is characterized by a considerable protuberance on the external edge of the outer condyle. A similar prominence above the inner condyle will denote an *internal* displacement. Occasionally the dislocation proceeds from preternatural laxity of the ligament of the patella, or of the tendon of the rectus muscle. Luxation of the patella *upwards* or *downwards*, noticed by most writers, cannot take place without a previous laceration of the ligament or tendon above mentioned. In the former case the patella will be drawn upon the front of the thigh two or three inches above the knee joint; in the latter it will remain stationary, except when the leg is bent. A patient belonging to the Alms-House Infirmary affords a very interesting example of luxation of both patellæ *upwards*, from rupture of their ligaments, occasioned by the exercise of leaping. It is remarkable in this case that the man has the use of his limbs nearly perfect, except when he attempts to walk up or down stairs.

The *tibia* and *fibula* may be removed from the *astragalus* in four different directions—outwards, inwards, forwards, and backwards. The luxation *inwards*, however, is the most common of all. It is known by the sole of the foot being turned outwards, and by the inner edge resting upon the ground. Luxation *outwards*, on the contrary, may be distinguished by the inclination of the sole inwards. These injuries are frequently conjoined with fracture of the lower extremity of the *fibula*. A *forward* luxation

is characterized by a diminution in the length of the front of the foot, and a corresponding increase in the length of the heel. The tibia abandons entirely the astragalus, and rests upon the naviculare and cuneiforme internum. Symptoms of an opposite kind will attend a luxation *backwards*. When from any cause the ankle joint has sustained severe injury, or the bones have been displaced in either of the directions enumerated, violent inflammation and suppuration will be apt to ensue, which may terminate in caries, separation of the astragalus from the adjoining bones, or in ankylosis. In several instances upon record the astragalus, nearly insulated by the injury, has been extirpated by the surgeon, and an union afterwards procured between the tibia and os calcis. *Compound* and *complicated* luxations of the ankle, which are generally followed by very severe and dangerous symptoms, will be considered hereafter under the head of *amputation*.

Treatment of Luxation of the Knee and Ankle.

By extension, counter-extension, and well directed pressure upon the condyles of the femur or head of the tibia, luxations of these bones are easily reduced; but to combat the inflammatory symptoms that ensue, will be found extremely difficult; and months, and even years not unfrequently elapse before the patient regains the use of the limb, if indeed he ever recovers. It must be obvious, therefore, that all those general and local means formerly pointed out as adapted to the cure of *wounded joints*,* will be found equally necessary in luxations of the knee.

* See ante, p. 163.

For that variety of luxation described by Hey, under the title of "*internal derangement of the knee joint*," the most effectual mode of relief, is to place the patient upon an elevated seat, and after having forcibly extended the limb, to bend the leg suddenly backwards at a right angle with the thigh.

Luxation of the *patella* is easily reduced, provided the limb be placed in the proper position, at the time pressure is made upon the bone. Unless this be attended to, the patient will suffer immensely, and the surgeon eventually be foiled. To ensure success, the thigh must be bent on the pelvis, and the leg extended on the thigh. The most convenient method of effecting this, is for the surgeon to rest the patient's heel on his own shoulder, or to have it sustained in a very elevated position by an assistant, whilst his hands are employed in forcing the bone into its proper situation.

An *inward* dislocation of the tibia at the ankle joint should be reduced in the following way. "The patient is to be placed upon a mattress properly prepared, and is to rest on the side on which the injury has been sustained; the surgeon is then to bend the leg at right angles with the thigh, so as to relax the *gastrocnemii* muscles, as much as possible, and an assistant, grasping the foot, gradually draws it in a line with the leg. The surgeon fixes the thigh, and presses the tibia downwards, thus forcing it upon the articulating surface of the *astragalus*."* The same principles are to be kept in view in the reduction of the other varieties

* Sir A. Cooper, p. 241.

of luxation at the ankle, taking care to relax the muscles as much as possible, before any attempt be made to push the bones into their proper places. The after treatment must consist chiefly in the removal of inflammation, and in the retention of the bones in their natural position by splints and bandages, until reunion of the ligaments and capsules is accomplished.

Consult, *Desault's Treatise on Fractures, Luxations, and other Affections of the Bones*, by Caldwell—*Boyer's Lectures upon the Diseases of the Bones*, by Farrell, vol. 2—*Boyer's Treatise on Surgical Diseases*, by Stevens, vol. 2—*Dorsey's Elements of Surgery*, vol. 1—*Hey's Practical Observations in Surgery*—*Pott on Fractures and Dislocations*—*Cooper and Travers' Surgical Essays*—*A Treatise on Dislocations and Fractures of the Joints*, by Sir Astley Cooper, 4to.—*C. Bell's Operative Surgery*, vol. 2—*Gibson's Case of Rupture of the Axillary Artery, from a successful Attempt to reduce an Old Luxation of the Os Humeri*, in vol. 7, of the *Philadelphia Journal of the Medical and Physical Sciences*—*A Letter to the Hon. Isaac Parker, Chief Justice of the Supreme Court of the State of Massachusetts, containing Remarks on the Dislocation of the Hip-joint, occasioned by the publication of a Trial which took place at Machias, in the State of Maine, June, 1824. By John C. Warren, Professor of Anatomy and Surgery in Harvard University*, &c. 8vo. 1826.

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